Atlantic Interoperability Initiative to Reduce Emissions (AIRE)

Update to the Environmental Working Group

Presented by: Jim McDaniel
Program Manager
James.McDaniel@faa.gov
202-493-4707

November 17, 2008

Meeting Agenda

- AIRE Objectives and Program Organization
- Metrics Results and Plans
- Domain Results and Plans:
  - Oceanic
  - Optimized Profile Descent (OPD)
  - Tailored Arrival (TA)
  - Surface

Introduction to AIRE

Marion C. Blakey

FAA Administrator

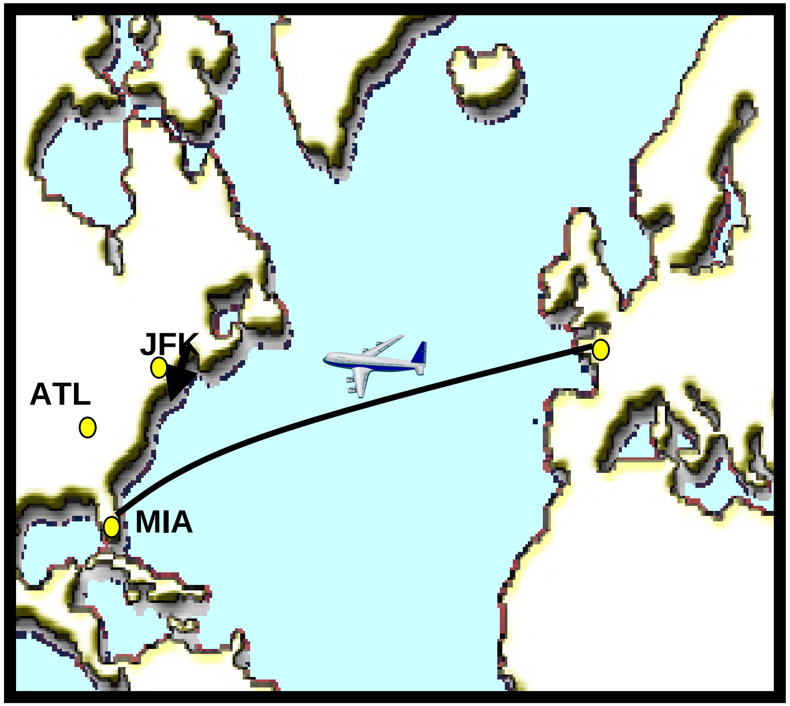
Jacques Barrot

EU Vice President &
EC Transport Commissioner

- **AIRE cooperative agreement signed at Paris Air Show in June 2007**
  - FAA
  - European Commission (EC)
- **Hasten development and implementation of environmental improvements for all phases of flight**
- **Validate improvements with flight trials and demonstrations**

Airline Industry Under Pressure to "Go Green"

AIRE Objectives



- Hasten development and implementation of operational procedures to reduce aviation's environmental foot print on a "gate-to-gate" basis
- Quantify environmental benefits to aid in formulation of potential business cases
- Accelerate incorporation and worldwide interoperability of procedures/standards
- Capitalize on existing technology on either side of Atlantic
- Identify implementation issues, obstacles, choke points, metrics and solutions, working with our European partners

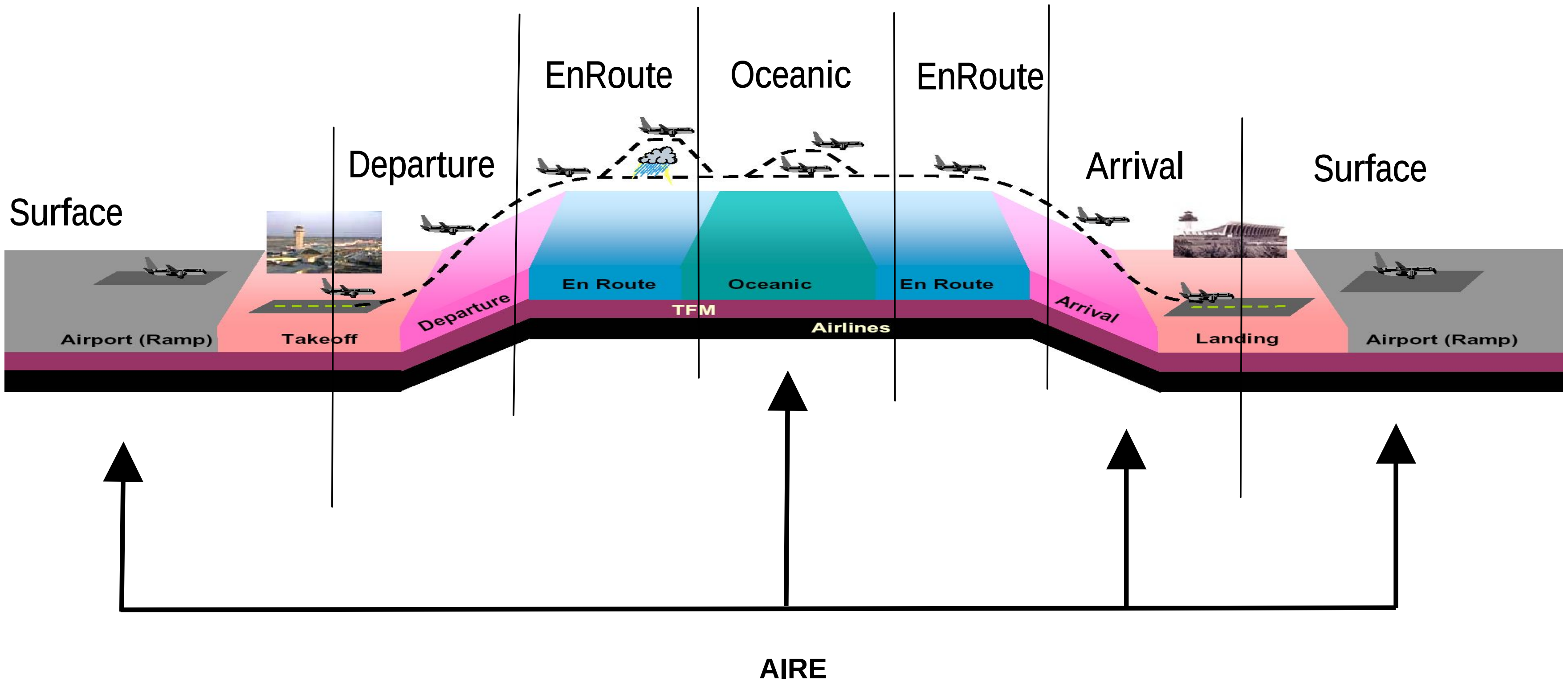
NextGen and AIRE

- AIRE is part of NextGen and SESAR efforts
- Environmental constraints to aviation growth are real
- AIRE allows FAA to address near term issues with stepping-stone approach and lay the foundation for the future
- Ultimate goal is innovative solutions that offer environmental protection and system efficiencies

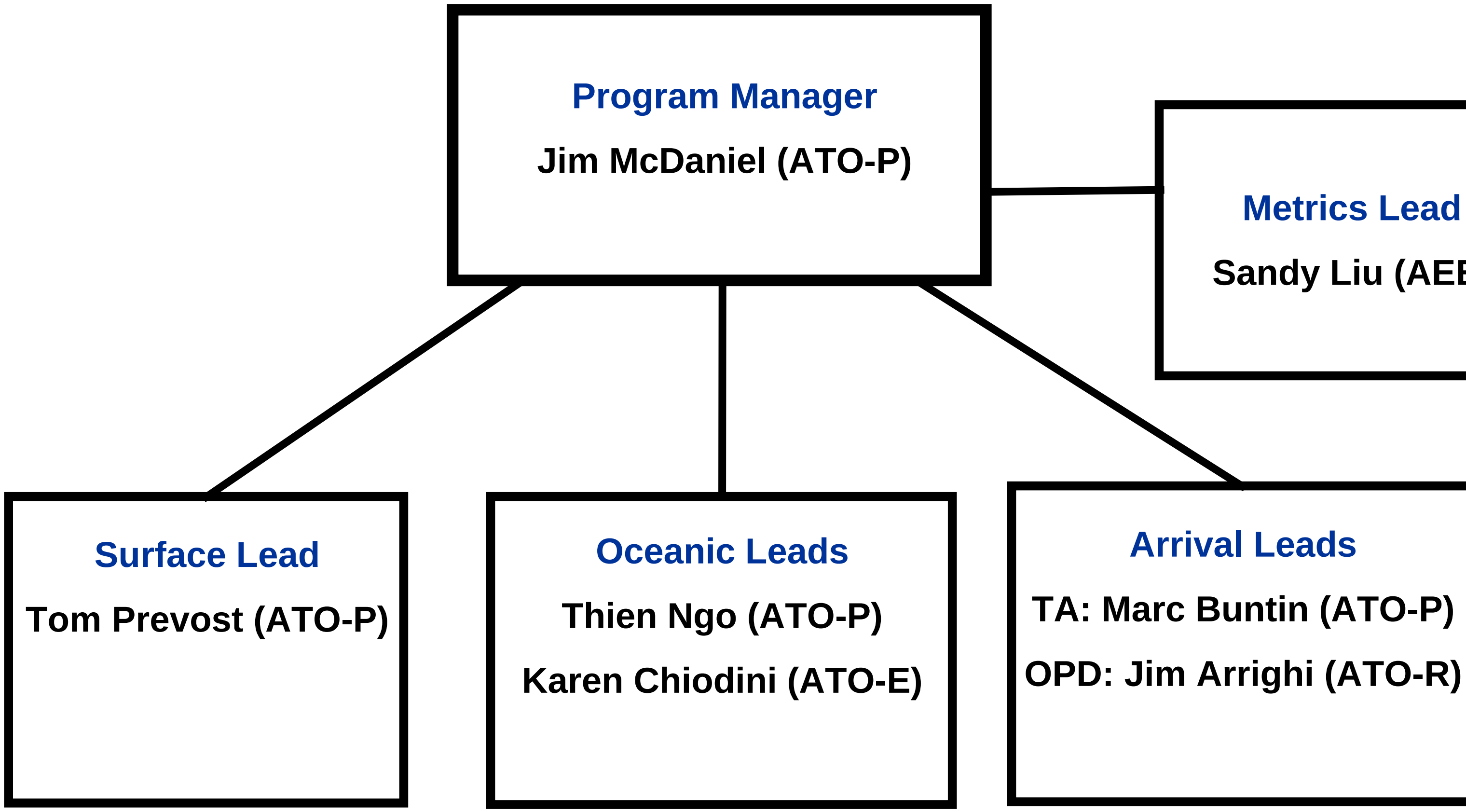
Systematic Program Approach

- **Near Term**
  - Conduct joint interoperability flight trials and demonstrations
  - Demonstrate environmental benefits achievable today
- **Mid Term**
  - Define business case
  - Conduct safety analysis
  - Help with production of standards in unified government/industry process
  - Conduct environmental impact analysis
- **Long Term**
  - Transition modules or segments to implementation

AIRE Domains



Program Management Team



AIRE Accomplishments:

- Jun 07: AIRE Agreement announced at the Paris Air show
- Jun 07: AIRE Brochure and Video presentation developed
- Oct 07: US AIRE Industry Partners meeting at FAA HQ
- Dec 07: FAA FY 08 AIRE Program Plan published
- Mar 08: Joint EC/US Meeting of AIRE in Brussels
- FY 08 demonstrations:
    - May 08: CDAs at Atlanta and Miami
    - May 08: Oceanic enhancements in the Atlantic
    - Sep 08: Tailored arrivals at Miami
- Jun 08: Joint EC/US AIRE PM Working Meeting in DC
- Jul 08: Kickoff Meeting for CDAs for Charleston (CHS)
- Jul 08: SDSS operational at MEM
- Aug 08: Surface ramp surveillance installation at JFK completed
- Sep 08: Report of Demonstration Results

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  - Surface
- Questions/Feedback/ Wrap-up
- Lunch
- Demonstrations

3:00 Adjourn

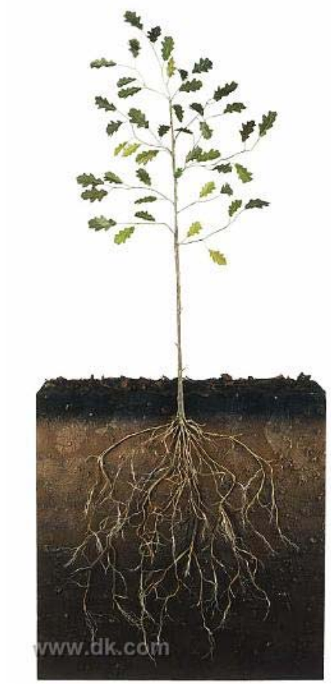
AIRE Metrics
Point of Contact

Project Lead

Sandy Liu

Sandy.Liu@faa.gov

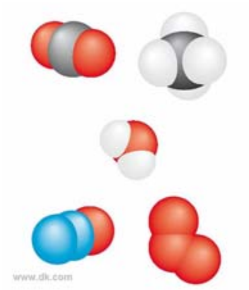
202-493-4864

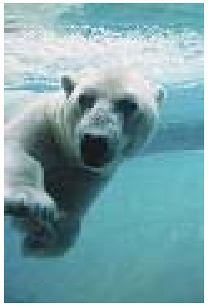


Metrics

Lead: Sandy Liu

Office of Environment & Energy (AEE)



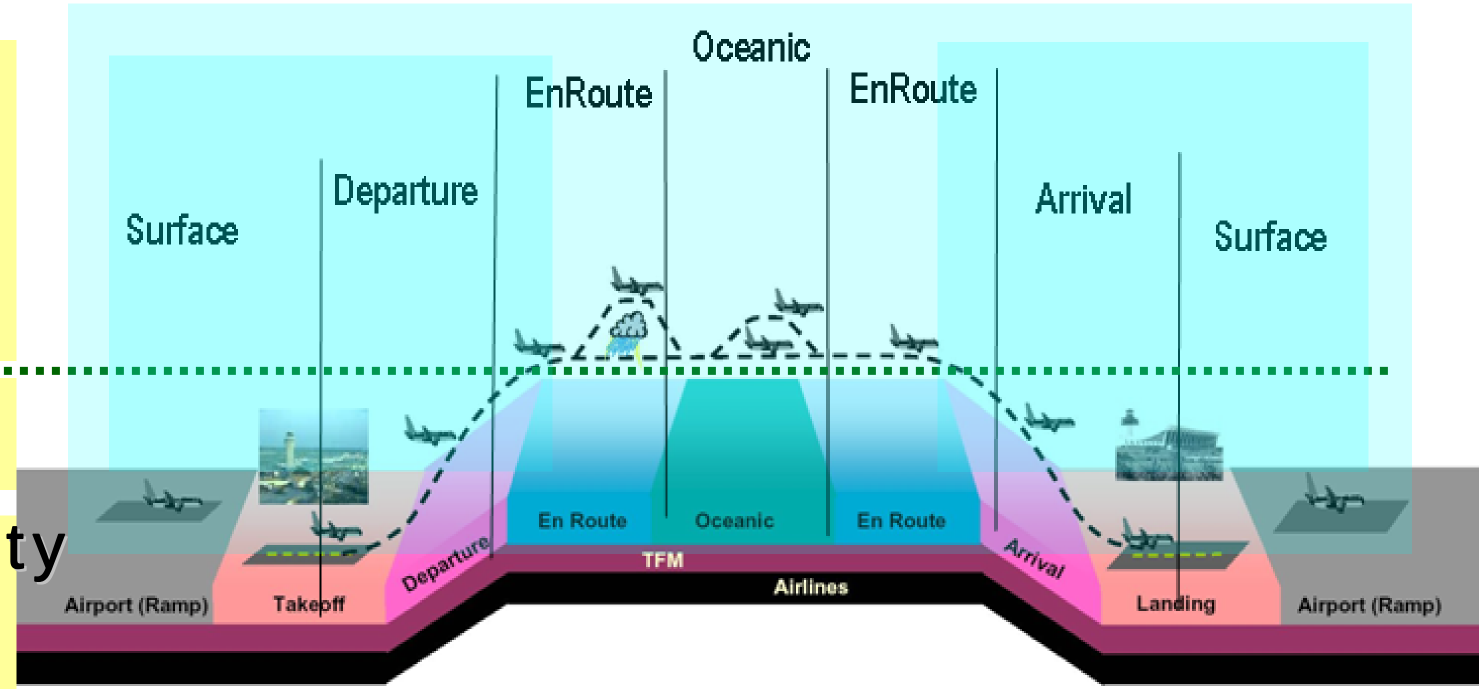


AEE/ATO RE&D & Environmental Focus

EMISSIONS NOISE

IMPACT RELATION

- Climate
- Noise
- Air Quality



- Aircraft & ATM Ops
- Energy Consumed

Performance & Efficiency

Technology

Environmental Approach

- The AIRE domain demonstrations are *proof of concept* ATM system enhancements that have been shown to offer major environmental benefits as well as improved operational efficiency.
- For each AIRE domain technology/technique, levels of fuel savings / emission and noise reductions will be quantified for the participating trans-Atlantic flights.
- Metrics will identify the overall potential for engine emissions and aircraft noise reduction.

AIRE Environmental Potential
(Reduce fuel burn, emissions & noise)

Domain - Demonstration Technology	Operational Metric (source)	Environmental Metric - Fuel Burn, lbs*	Est. Potential Fuel Saving by ATM (Margin of efficiency improvements)	Baseline (rel. ops levels)
Surface	**Taxi time measured**	**Derived using ICAO Engine Performance Data**	**2%**	**MEM historical ops & JFK ops (w/o ASDE-X) Vs Installed ASDE-X**
Oceanic	**Fuel burn calc/ measured**	**As measured by Airline participant(s)**	**4%**	**Filed Flight Plan Vs Enhanced Actual Flight Profile**
Arrival	**Flight Trajectories measured**	**Derived by FAA Aviation Environmental Design Tool (AEDT) or ICAO BADA equivalent**	**2%**	**Pre CDA/TA Operations Vs Newly developed CDA/TA**

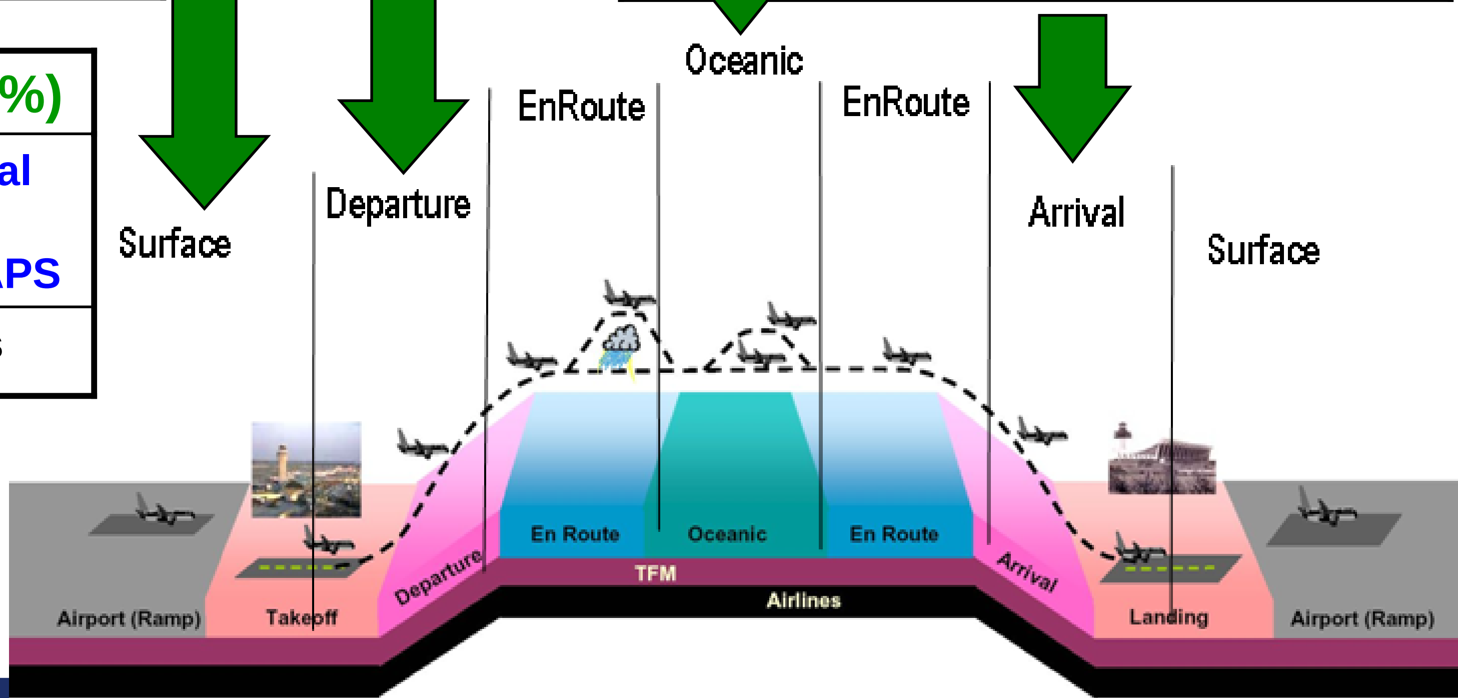
Efficiency Mechanisms

SURFACE (12%)
Min APU use or alt clean power
"just in time" refueling
Min taxi time & holds (continuous transit)

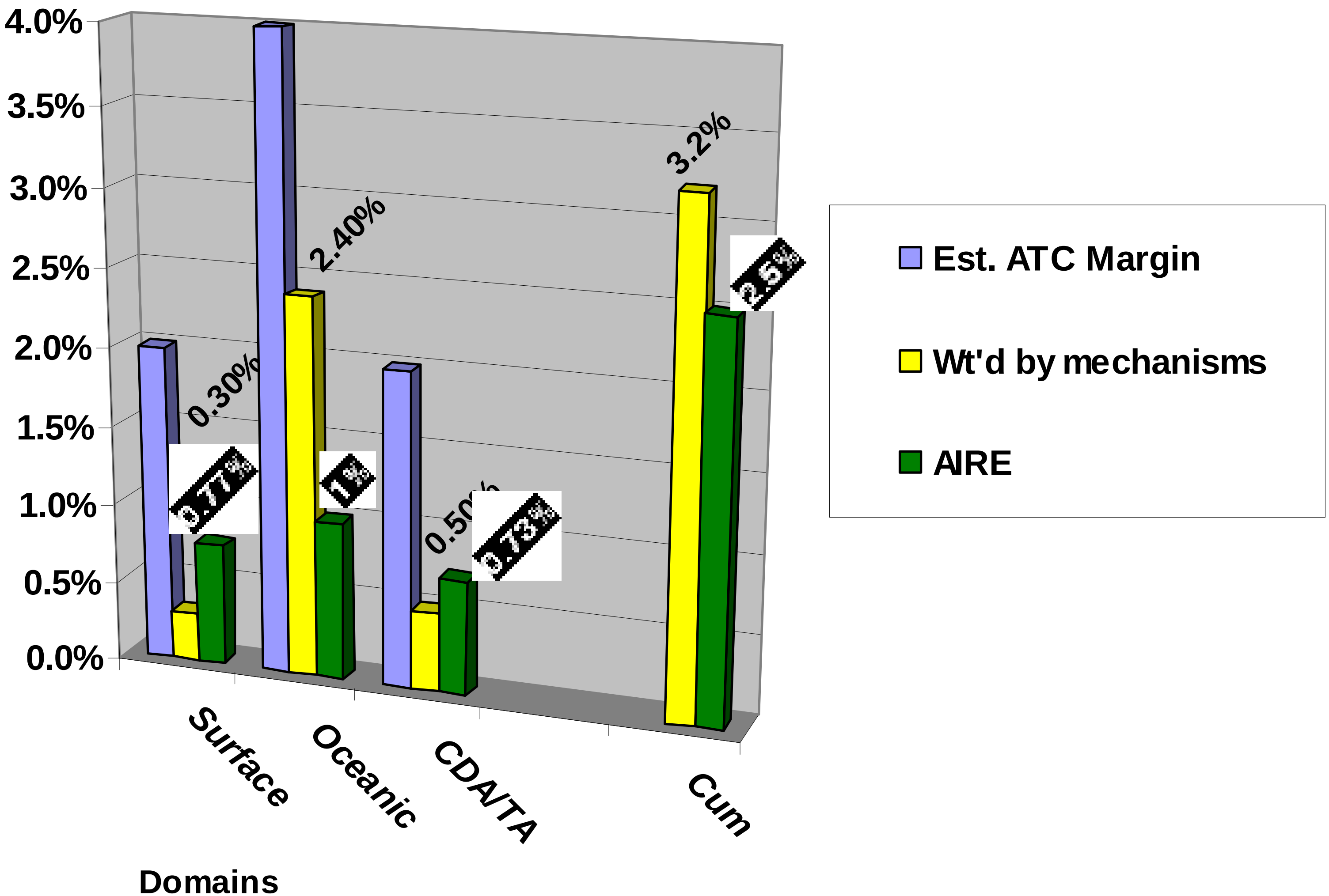
DEPARTURE (3%)
use of Maximum climb power

OCEANIC (60%)
use of UPR-User Preferred Routes– updated winds
Use of DARP - Dynamic Airborne Reroute Procedure - shorten path
operate at optimum altitude/flt level
Cost Index (economy speed)

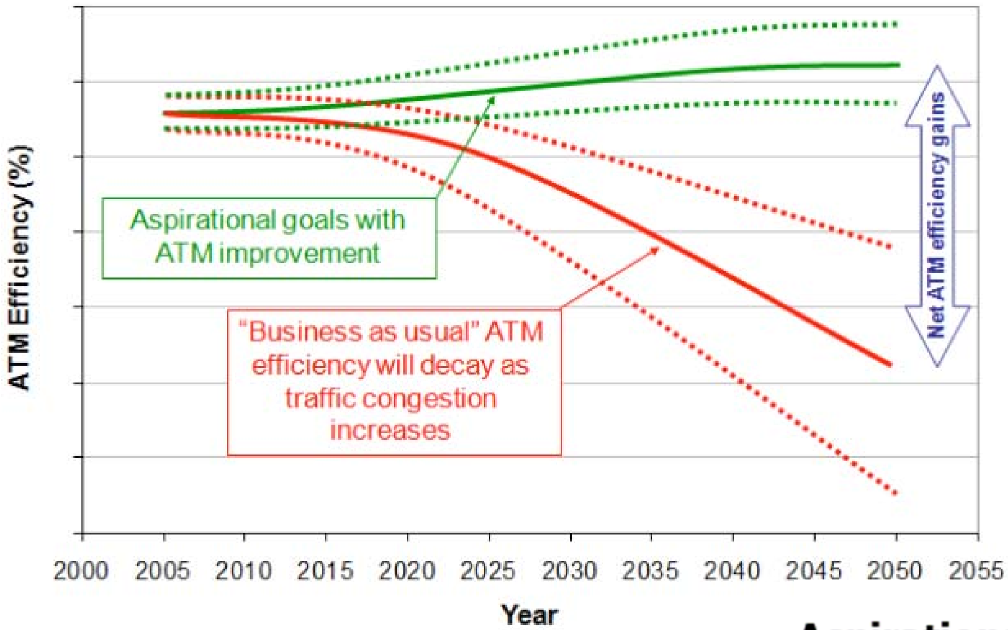
ARRIVAL (25%)
Request optimal vertical – CDA/OPD/TA/TAPS
Delayed flaps



FY08 AIRE Fuel Savings (current technology)



ATM Global Environmental Efficiency Goals for 2050
Reducing the Impact of ATM on Climate Change



(DRAFT & IN DEVELOPMENT)

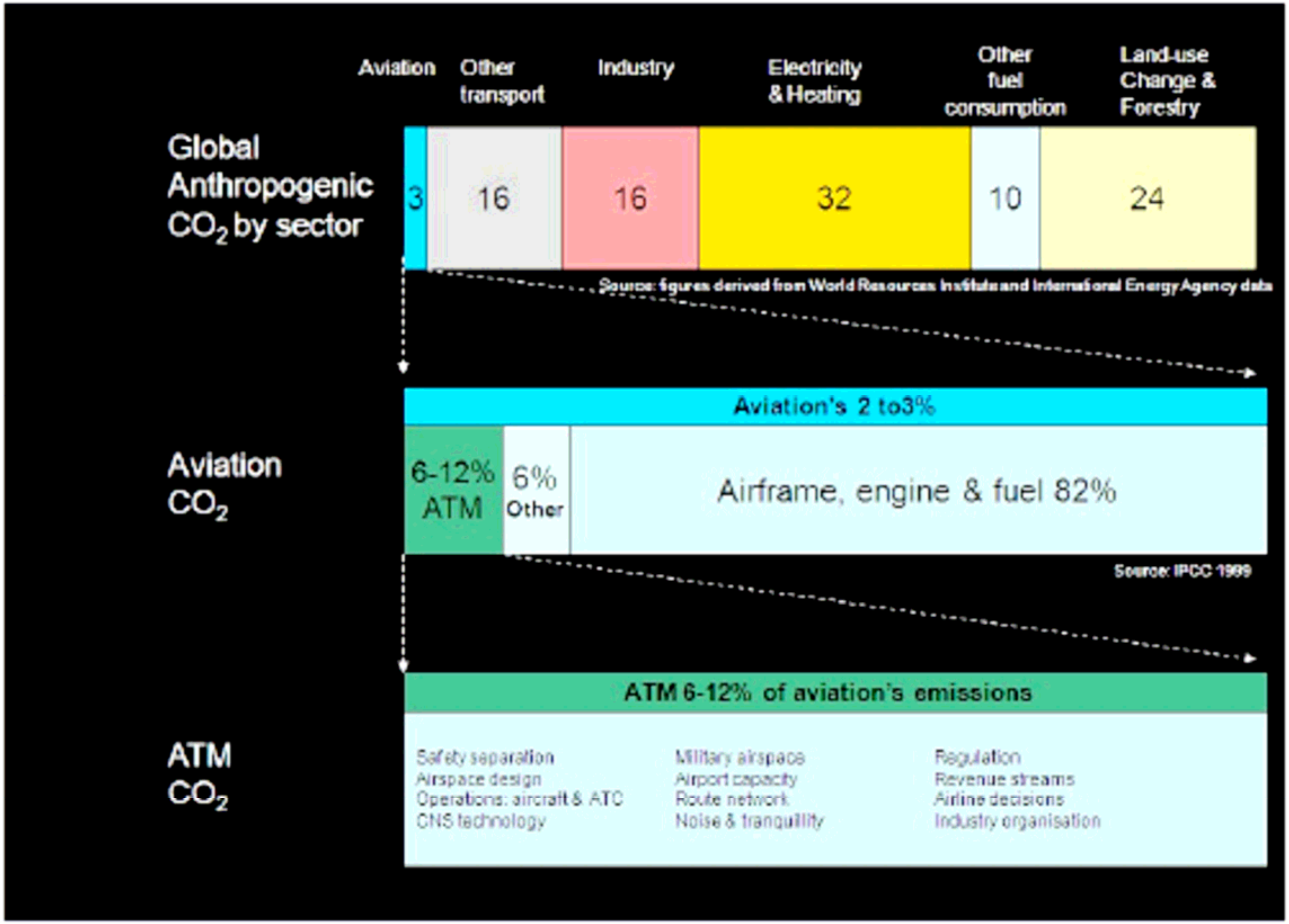
canso
civil air navigation services organisation

Aspirational Goals for ATM efficiency improvement

	Year	Global ATM efficiency
Baseline	**2005**	Between 92% & 94%
Goal 1	**2012**	Between 92% & 95%
Goal 2	**2020**	Between 93% & 95%
Goal 3	**2050**	Between 95% & 98%

Table 1: CANSO ATM Efficiency Aspirational Goals

IPCC Estimation of Aviation CO2 Influence



FY08 AIRE Findings & Potential Savings

FY2008 Activities	Demonstration	AIRE/ASPIRE Benefits	Cost Saving@ $3.08/gal (10/3/08)
Oceanic TBO	May Demo- Completed	~ 47 gals/flt	~$145/flt
CDAs @ ATL/ MIA	May Demo- Completed	~38-50 gals/flt	~$150/flt
ASD-X@MEM/JFK	Recently activated	est~ 50 gals/flt	~$150/flt

Current Spain to Caribbean Islands	AIRE Cumulative Total:	Est. 150 gals/flt X 40 flts/wk	$960K/ annually

Projected Annual Environmental Benefits

AIRE Current Spain to Caribbean Islands

CO2 Emissions Equivalencies for ASPIRE Demo:

Can potentially save 3K metric tons CO2 = (40 flt ops/wk)

- Annual greenhouse gas emissions from **500** passenger vehicles

Energy:

- CO2 emissions from **312,000** gallons or **6,400** barrels of oil consumed
- CO2 emissions from the electricity use of **365** homes for one year

Off-set Mitigation:

- Carbon sequestered by 70,500 tree seedlings grown for 10 years

Relative to Nature's Cycle:

- Carbon sequestered annually by **625** acres of pine or fir forests

Conservation:

- CO2 emissions avoided by recycling **1,000** tons of waste instead of sending it to the landfill

FY 09 Metrics Plan

FY09 AIRE Metrics Plan & Strategy - November 08

Surface:

Measure taxi time (# & duration of starts/stops); a/c type (fuel burn rate); minimize transient ops

Oceanic:

Apply latest (wind data) Flight Plan; UPR; optimal altitude, speed, settings.

Arrivals:

Explore ATM conditions for optimized profile descent (OPD)/CDAs and Oceanic Tailored arrivals (TA)

Integrated Oceanic/Arrival Metrics Plan January 09

Explore initial and smooth bridging of domain systems and processes

FY09 Findings and Recommendations September 09

Environmental Metric-

Payload fuel efficiency

Payload fuel efficiency, PFE, can be estimated from the U.S. DOT Form 41 data according to the following formula:

PFE = (RevPaxMiles * X / 2000 + RTM_freight + RTM_mail) / (fuel * LHV), where

PFE = payload fuel efficiency, in ton-miles per BTU and converted to kg-km/MJ
RevPaxMiles = revenue passenger miles, passenger-miles
RTM_freight = freight revenue ton miles, ton-miles
RTM_mail = mail revenue ton miles, ton-miles
fuel = volume of fuel consumed, gallons
LHV = fuel volumetric energy content, 124,000 BTU/gal
X = weight allotment per passenger

Quantifies:

- productivity (payload moved a given distance) achieved by aviation per unit energy consumed by the aircraft
- profitability
- environmental impacts of commercial aviation.

A change to fuel energy from fuel volume on alternative energy for aviation (independent of future changes in the aviation fuel mix).

Backup Slide follows

FAA – NextGen Initiatives (from CANSO doc)

FAA-Nextgen Initiative	Flight phase affected	Selected ATM Implementations Near Term Committed	Mid Term 2012-2018	Far Term 2020*
Collaborative Air Traffic Management				
Airspace Flow Program	Horizontal, Delay, Taxi			
Reroute Impact Assessment and Resolution	Taxi and Horizontal			
TMI w flight specific trajectories	Taxi and Horizontal			
Improve Special Airspace Management	Horizontal			
Trajectory flight data management	Horizontal			
Manage Airspace to Flow/Trajectories	All airspace delay/Taxi			
Full Collaborative Decision Making	Horizontal/Vertical/Taxi			
Initiate Trajectory based Operations				
RNAV/RNP Increased Departure Routes	Taxi and terminal			
NY and ORD Area Airspace Redesign	Taxi and terminal			
Time Based Metering (moves delay to more fuel efficient altitudes)	Delay and vertical			
ADS-B in Gulf of Mexico	Delay/Horizontal			
Delegated responsibility for Separation	Horizontal/Vertical			
Initial Conflict Resolution Advisories	Horizontal			
Point in Space Metering	All			
Increase Capacity and Efficiency Using RNAV and RNP	All			
Expand Conflict Resolution via Data Communication	Horizontal			
Increase Arrivals and Departures at High Density Airports				
Improved operations at closely spaced parallel runways	All in Low Vis			
Initial Surface Traffic management	Taxi			
Time Based Metering Using RNAV and RNP Route Assignments	Horizontal/Vertical			
Integrated Arrival and Departure Airspace management	Horizontal/Vertical/Taxi			
Optimize Runway Assignments	Taxi			
Use Data Management to Provide Flow and Taxi Assignments	Taxi and Horizontal			
Reduce Horizontal Separation Standard to 3 miles	Horizontal			
Full Surface Traffic Management with Conformance Monitoring	Taxi			
Use Aircraft Provided Intent Data to Improve Flow and Conflict resolution	Horizontal/Vertical			

*Far Term designates initial operating capability prior to 2025

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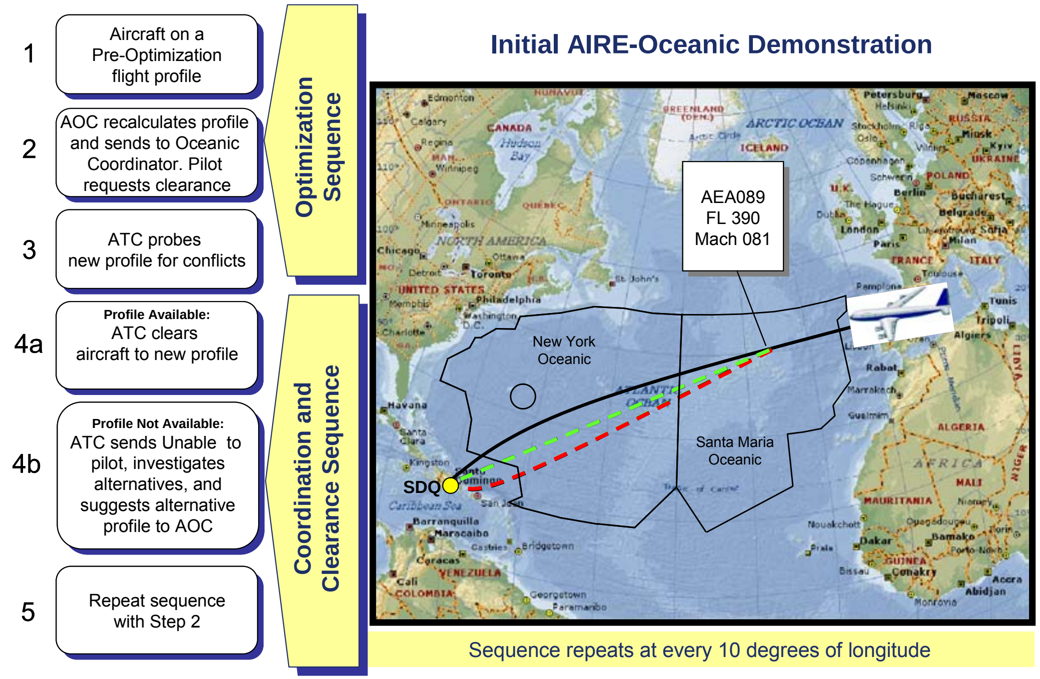
AIRE Oceanic Points of Contact

Project Co-Lead
Thien Ngo, ATO-P
Thien.Ngo@faa.gov
202-267-9447

Project Co-lead
Karen Chiodini, ATO-E
Karen.Chiodini@faa.gov
202-493-5248

AIRE Oceanic / Integration Description & Objectives

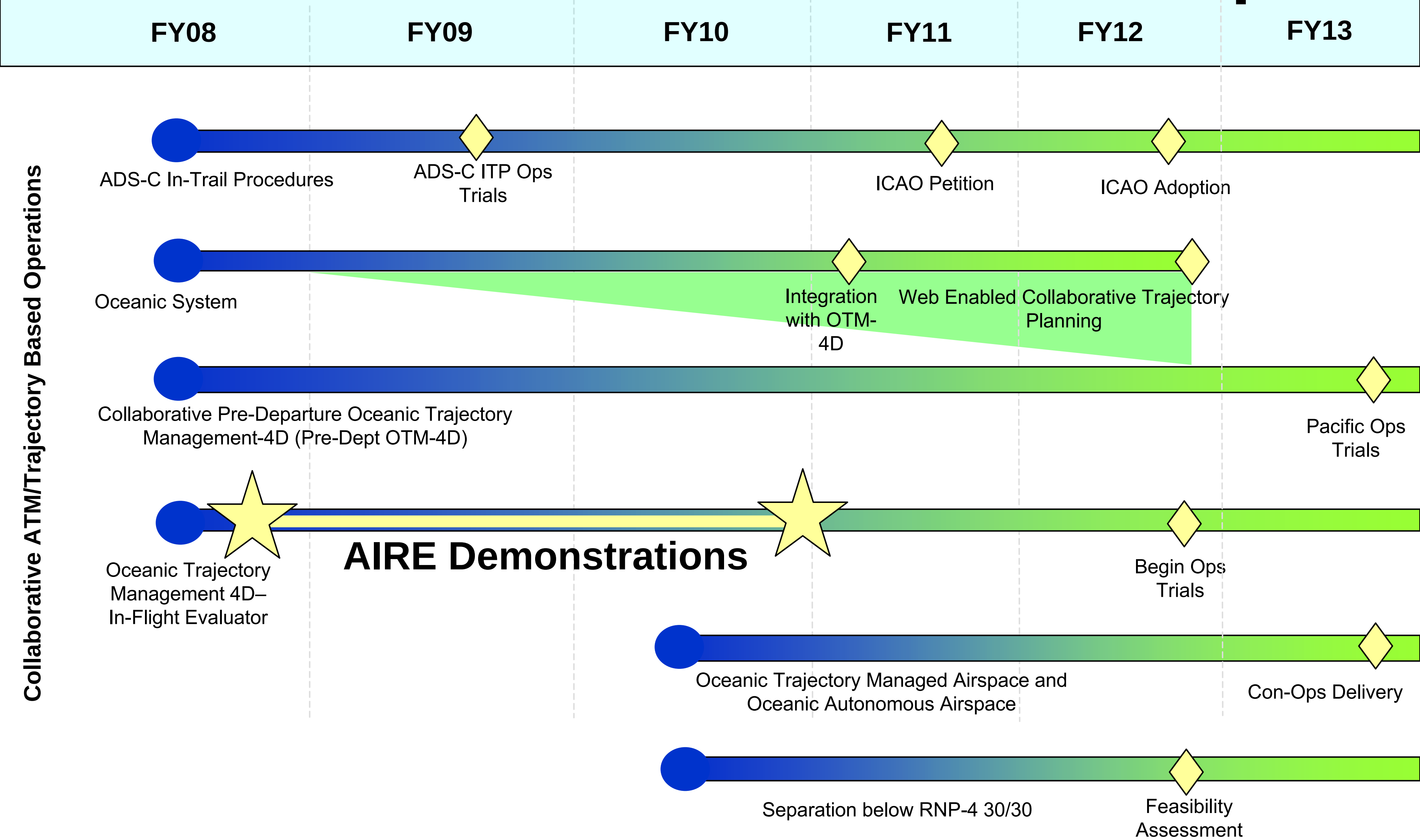
- Analyze AIRE demonstration performance and establish baseline to measure fuel consumption and emissions
- Investigate the use of existing oceanic systems and trajectory optimization tools to improve fuel savings and reduce emissions
- Validate new procedures and tools in a controlled environment
- Establish AIRE demonstration activities and partnerships with airlines, industry and other government agencies



NextGen Oceanic Trajectory Based Operations (TBO) and AIRE Oceanic Vision and Benefit Correlation

- Oceanic Trajectory Management – 4D (OTM4D) will provide more optimal trajectories by
  - finding alternative solutions for oceanic entry, when the preferred choice is not available, and by
  - identifying opportunities to improve trajectories in-flight
- Reduced separation standards for properly equipped aircraft lead to fewer predicted conflicts, and as a result, fewer diversions from the preferred routing
- Oceanic efficiency enhancements and separation reductions result in increased capacity within flow constrained airspace, allowing more aircraft to fly through these areas

NextGen Oceanic TBO Roadmap



Initial AIRE-Oceanic Demonstration Partners

Federal Aviation Administration

European Commission

NATS
U.K. National Air Traffic Services

NAV
NAV Portugal, E.P.E.

VERACITY ENGINEERING

AirEuropa
www.aireuropa.com

IBERIA

MITRE CAASD

CSSI, INC.

BOEING

Air Europa Flight Information for the Initial AIRE-Oceanic Demonstrations

Departure	Destination	Test Dates	Flight Number	Datalink Equipage
Madrid, Spain (MAD)	Havana, Cuba (HAV)	Mondays (19 & 26)	AEA051	FANS 1/A (Airbus A330)
Madrid, Spain (MAD)	Santo Domingo, Dominican Republic (SDQ)	Mondays (19 & 26)	AEA089	FANS 1/A (Airbus A330)
Madrid, Spain (MAD)	Havana, Cuba (HAV)	Tuesdays (20 & 27)	AEA051	FANS 1/A (Airbus A330)
Madrid, Spain (MAD)	Caracas, Venezuela (CCS)	Tuesdays (20 & 27)	AEA071	FANS 1/A (Airbus A330)

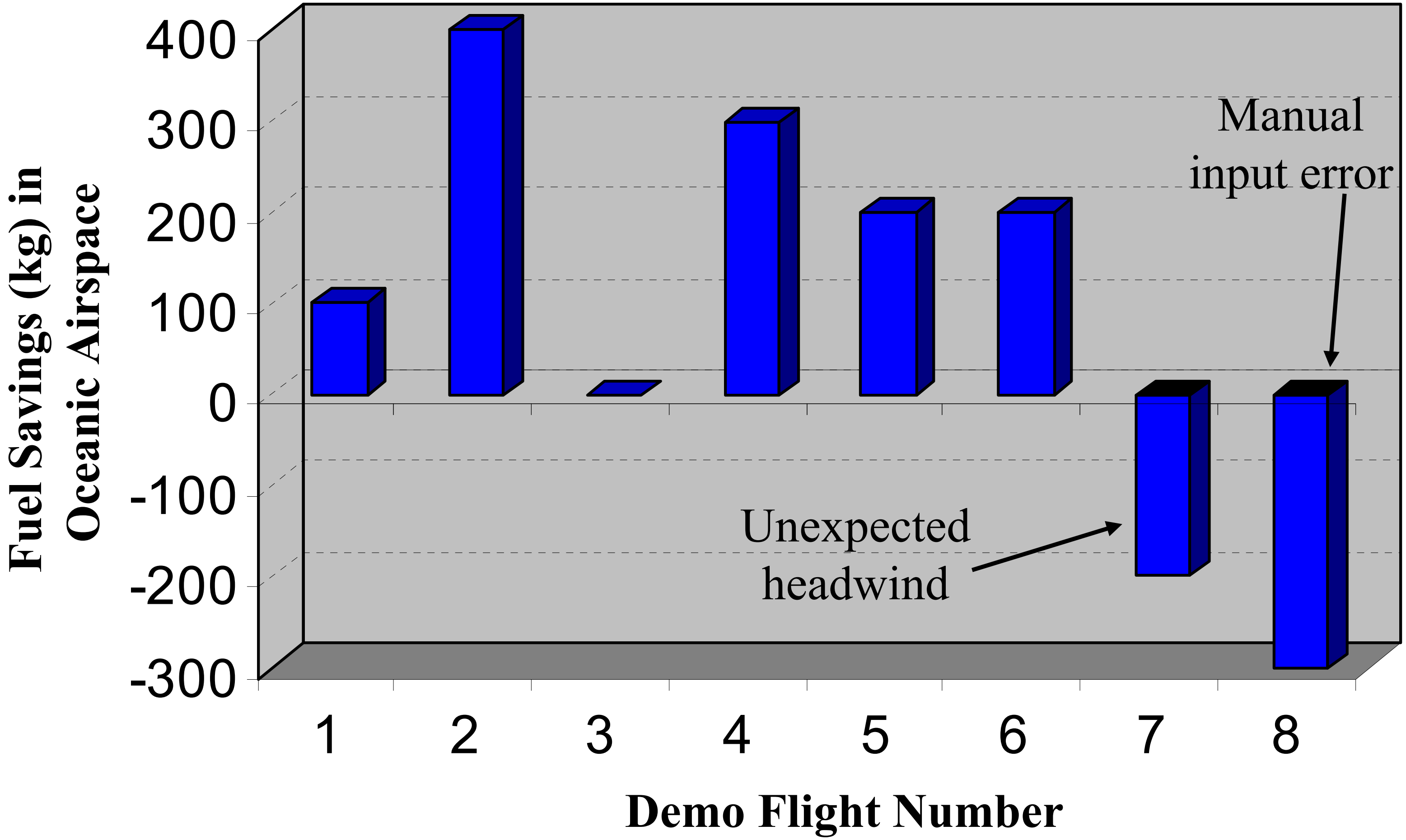
Fuel Savings from More Direct to Destination Route Change

Picture: Courtesy of Air Europa Airlines

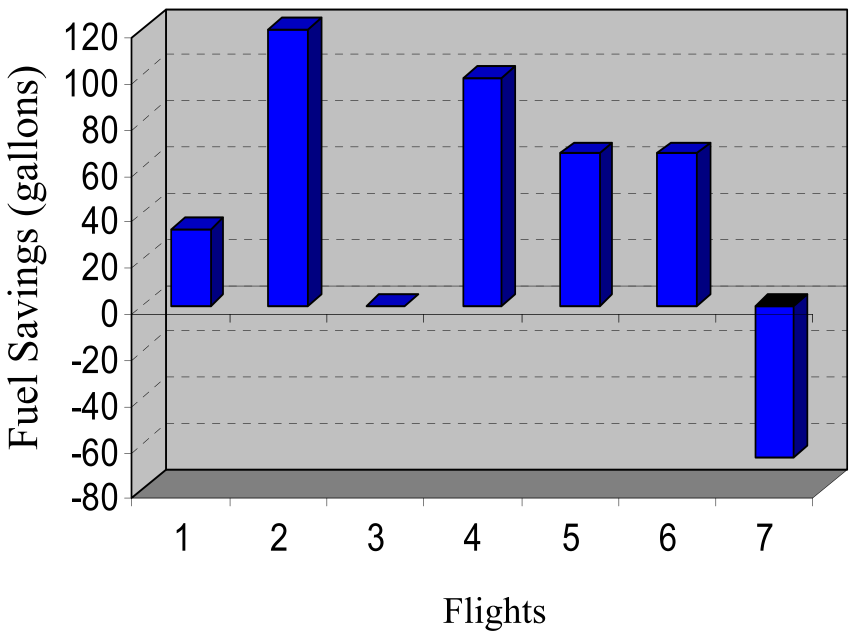
Fuel Savings from Avoiding Strong Headwinds

Picture: Courtesy of Air Europa Airlines

Initial AIRE-Oceanic Demonstration Results



Initial AIRE-Oceanic Demonstration Results



Demonstration Dates:
May 19, 20, 26, and 27, 2008

- Total 6,946 lbs of CO_2 with 7 flights (up to 1% fuel saved). This equates to:
  - CO_2 emissions from 330 gallons (6.8 barrels) of oil consumed
  - CO_2 emissions avoided by recycling 1.0 ton of waste instead of sending to landfill
  - Carbon sequestered by 75 trees seedlings grown for 10 years

Initial AIRE-Oceanic Demonstration Results

- Analysis from Air Europa Airlines showed improvement in fuel savings up to 1% in oceanic airspace
  - Based on eight (8) oceanic flights
  - Applied continual trajectory adjustments during flight using manual procedures
  - Route optimized within New York Center and Nav Portugal controlled airspace only
- Result indicated significant savings according to Air Europa Airlines

Initial AIRE-Oceanic Demonstration Outcomes / Observations

- Demo provided valuable information for the longer term OTM-4D development
- Collaboration provides framework for global harmonization consistent with NextGen and SESAR
- Demo provided estimates of fuel savings for a limited number of flights
- Demo highlighted need for co-ordination among oceanic centers, AOC, ATC, and flight crew
- Demo identified need to expand to include more flights
- Provide valuable insight towards automation systems development

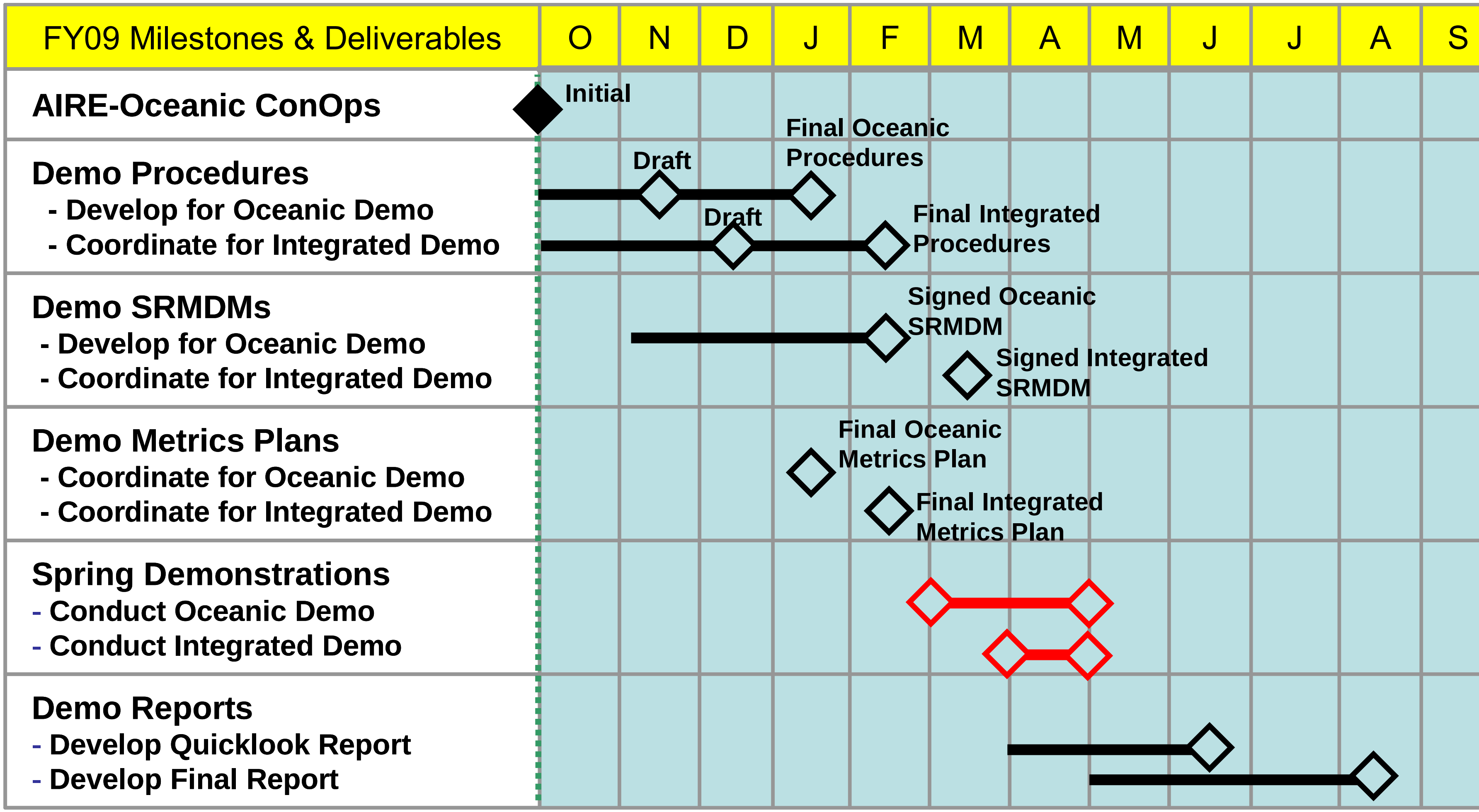
FY09 AIRE-Oceanic/Integrated Demonstrations

- Expand domestic and international partnerships
  - Include more partners (airlines, ATC centers)
- Include both westbound and eastbound flights
- Integrate with other domains to explore gate-to-gate concepts
  - Integrated AIRE Oceanic & Tailored Arrivals (TA) and/or Optimized Profile Descent (OPD) demonstrations
- Identify requirements for early implementations
  - Leverage AIRE-Oceanic demo results and lessons learned
- Expand data collection and analysis

AIRE Oceanic/Arrivals Integration: Potential Partners

Service Providers	Airlines	Airports	Industry
• NY Center (ZNY)	**Oceanic Demo:**	• Miami (MIA)	• Boeing
• Miami Center (ZMA)	• Air Europa	• Paris (CDG)	• CSSI
• Miami Approach	• Iberia	• Madrid (MAD)	• MITRE
• WJHTC	• American	• Frankfurt (FRA)	• CAASD
• Nav Portugal	• Air France	• London (LHR)	
• UK NATS	• Lufthansa		
• Eurocontrol			
	Integrated Demo:		
	• American		
	• Air France		
	• Lufthansa		

FY09 AIRE–Oceanic/Integration Schedule



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- Lunch
- Demonstrations

3:00 Adjourn

AIRE Optimized Profile Descent (OPD) Point of Contact

Project Lead

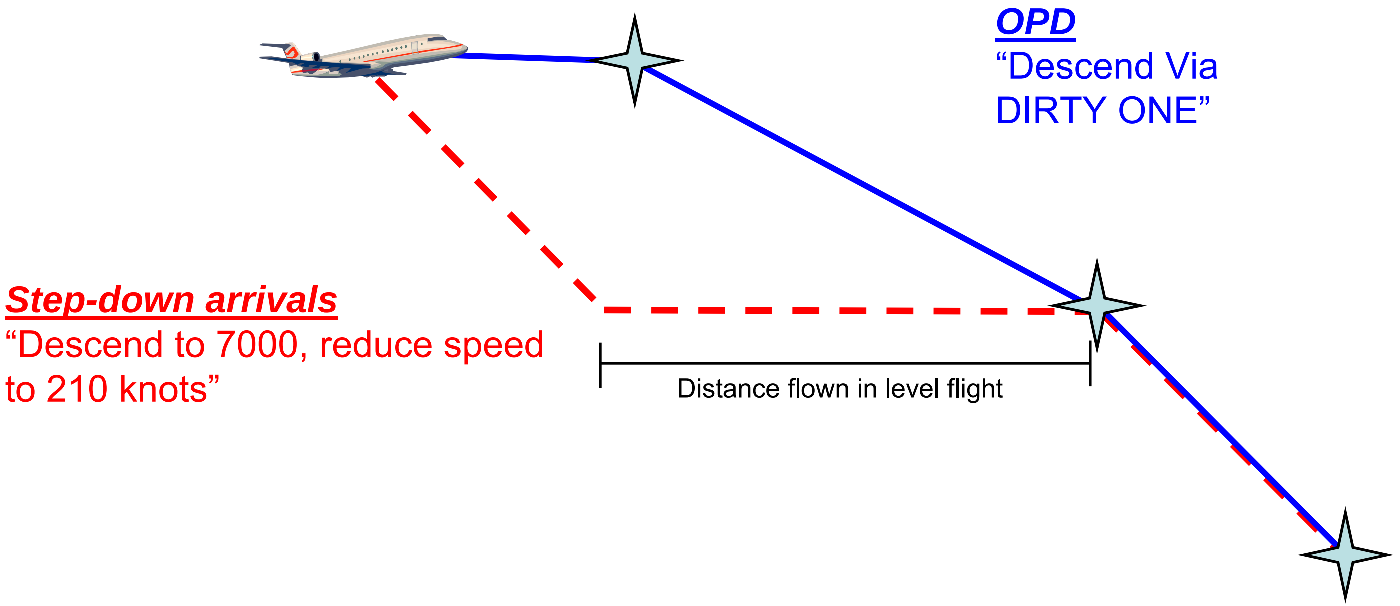
Jim Arrighi, RNAV/RNP

James.Arrighi@faa.gov

202-385-4680

Optimized Profile Descent (OPD) - What Is It?

- **Published procedure**
  - Possibility of vertical and/or speed constraints
- **Provide a more optimized descent profile**
  - Increased opportunity for reduced-power descent
  - Time, Fuel, Emissions Benefits

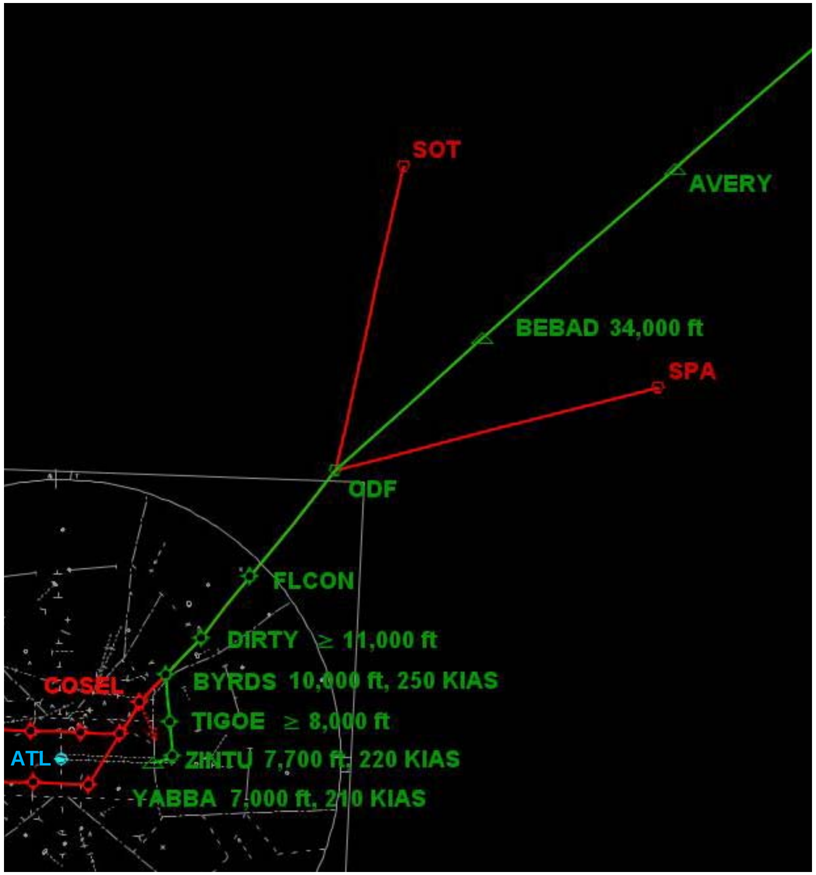


FY08 OPD Activities

- **AIRE OPD Coordination**
  - Two OPD procedures were developed at ATL and MIA
  - 21 OPD demonstration flights were conducted
- **Technical Analysis**
  - AIRE CDA/OPD Demonstration Recap
  - Benefit Analysis of AIRE CDA Demonstration Flights
  - AIRE CDA Human-In-The-Loop (HITL) Simulations
  - AIRE CDA Airspace and Airport Impacts

AIRE OPD Procedure Development

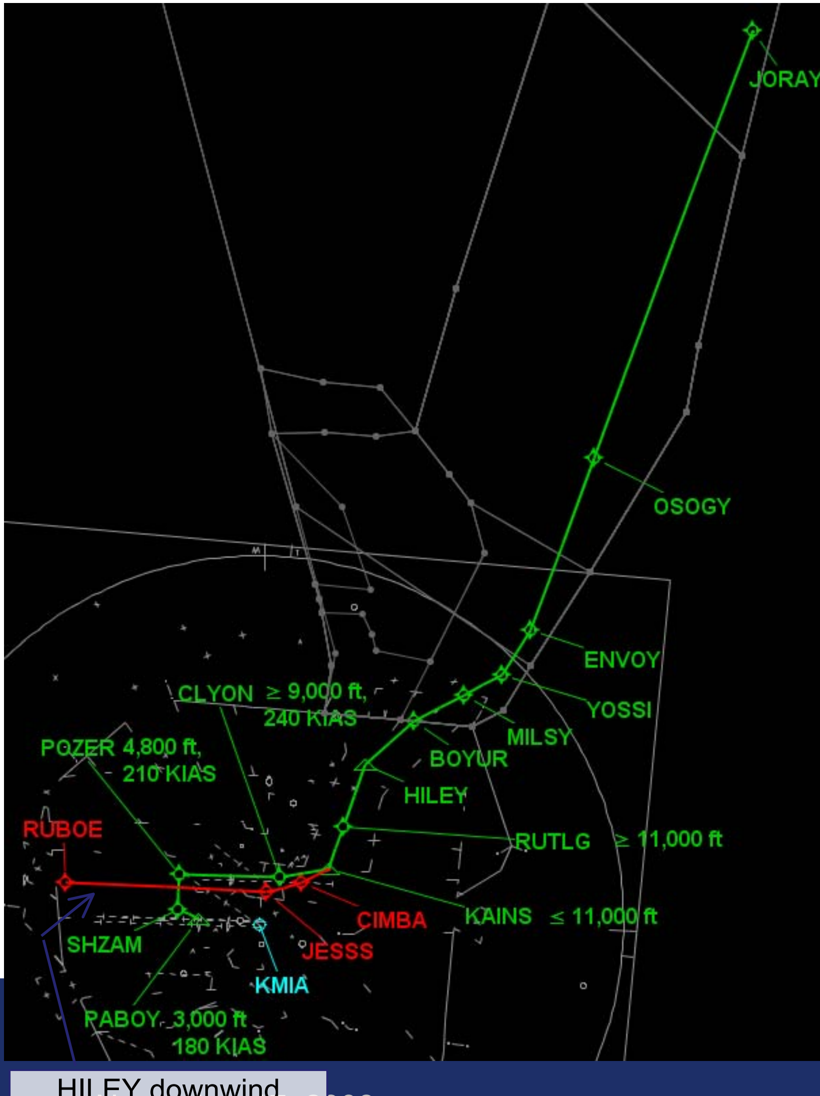
DIRTY (OPD) Compared To FLCON (Non-OPD)



DIRTY	Waypoint		FLCON
	MOL		
	JOINN		
	AVERY		
34,000 ft	BEBAD		Expect to cross at 34,000 ft
	ODF		
	FLCON		
≥ 11,000 ft	DIRTY		Typically cross at 13,000
10,000 ft, 250 KIAS	BYRDS		
≥ 8,000 ft	TIGOE	COSEL	250 KIAS
7,700 ft, 220 KIAS	ZINTU	---	Landing West: Expect radar vectors to final approach course
7,000 ft, 210 KIAS	YABBA	---	
DIRTY		FLCON	

AIRE OPD Procedure Development

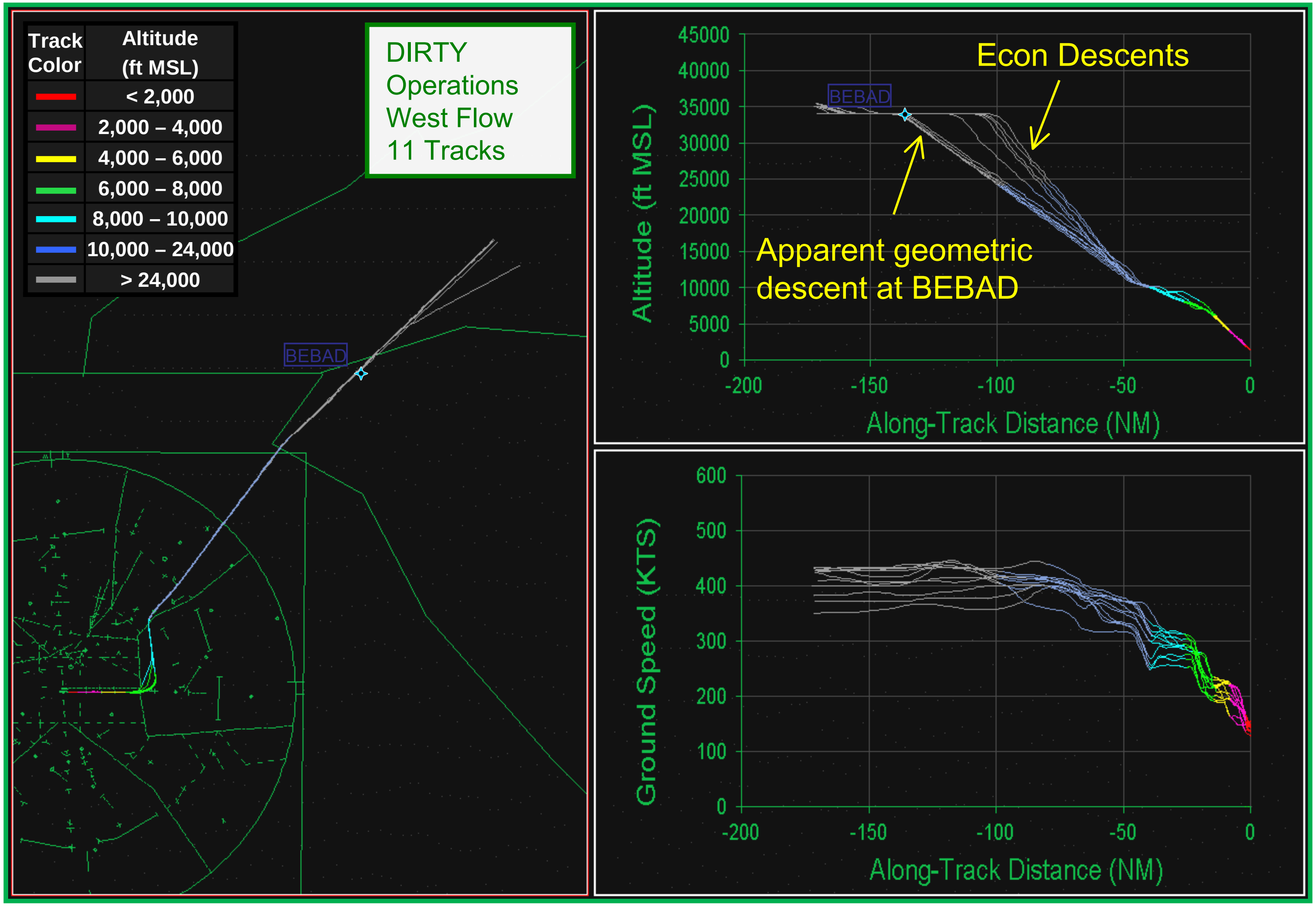
RUTLG (OPD) Compared To HILEY (Non-OPD)



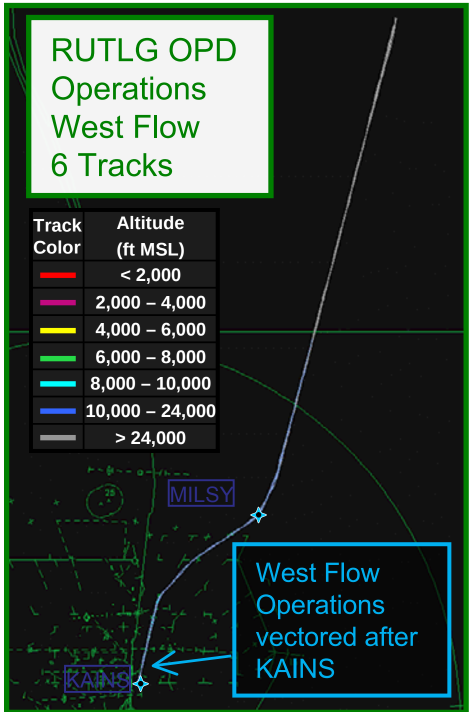
RUTLG	Waypoint		HILEY
	JORAY		Typically at cruise altitude and given a descent to FL360
	OSOGY		Typically told to cross at FL240
	ENVOY		
	YOSSI		
	MILSY		Expect 16,000 ft, 250 kts
	BOYUR		Descended to 10,000 ft once in TRACON airspace
	HILEY		
≥ 11,000 ft	RUTLG		Descended to 8000 ft abeam Ft. Lauderdale Airport
≤ 11,000 ft	KAINS		
≥ 9000 ft, 240 KIAS	CLYON	CIMBA	
4800 ft, 210 KIAS	POZER	JESSS	Descended to 3000 ft abeam Miami Airport
	SHZA	RUBO	

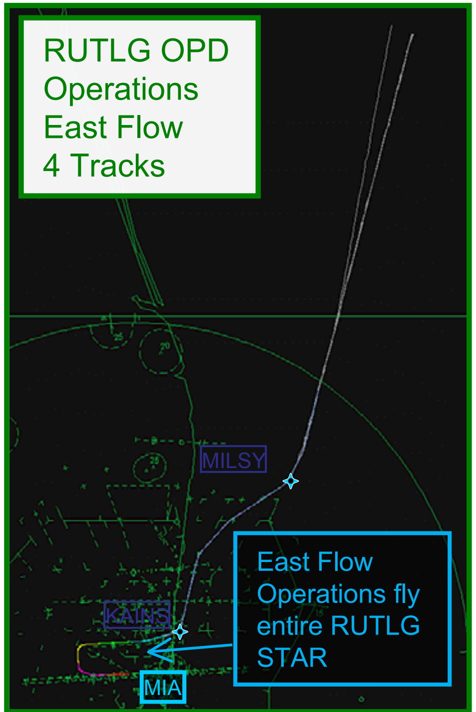
FL – Flight Level
kts - knots

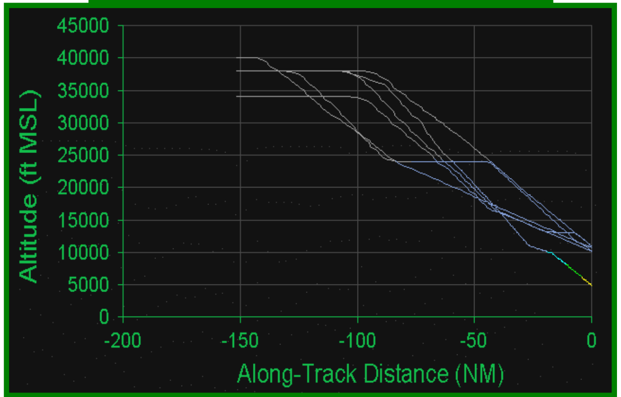
AIRE CDA/OPD Demonstration Flights - Atlanta

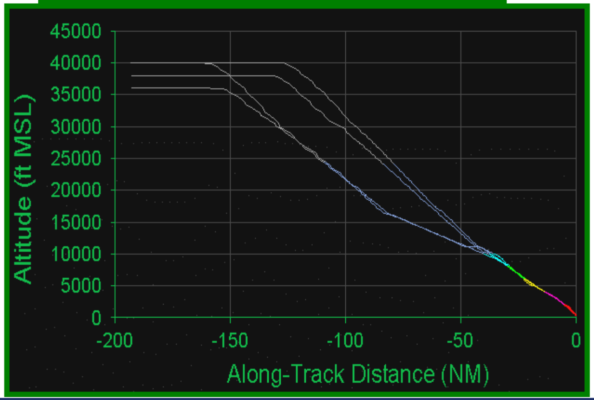


AIRE OPD Demonstration Flights - Miami



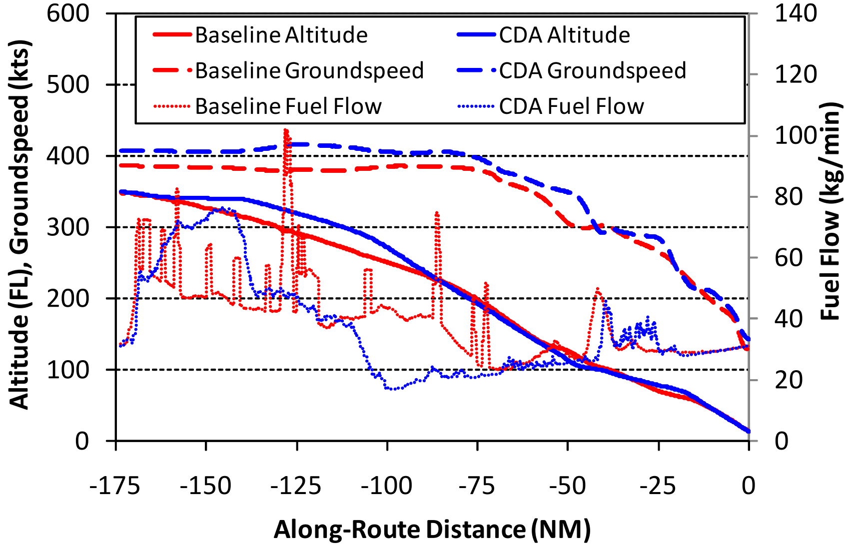






Atlanta OPD Benefits Analysis Results

Metric	Baseline Average Per Flight	Average OPD Difference from Baseline
Fuel Burn (gal)	393	-38 (-10%)
CO_2 emissions (kg)	3780	360 (-10%)
Time		)

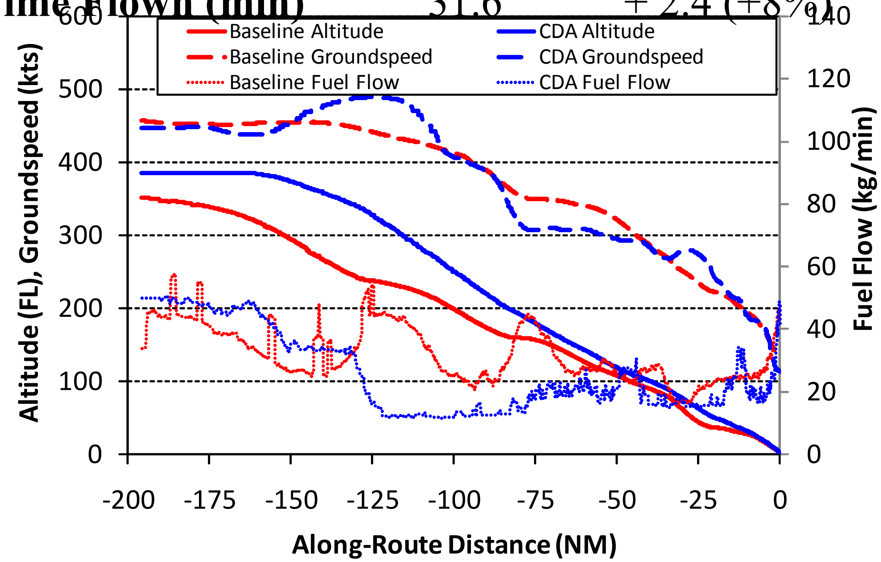


- **Estimated fuel burn reductions of 38 gallons per flight**
- **Estimated CO_2 emissions reductions of 360 kilograms per flight**
- **Observed time savings of 0.8 minutes per flight**
  - Consistent with higher average groundspeeds for CDA flights

Miami OPD Benefits Analysis Results

East Flow

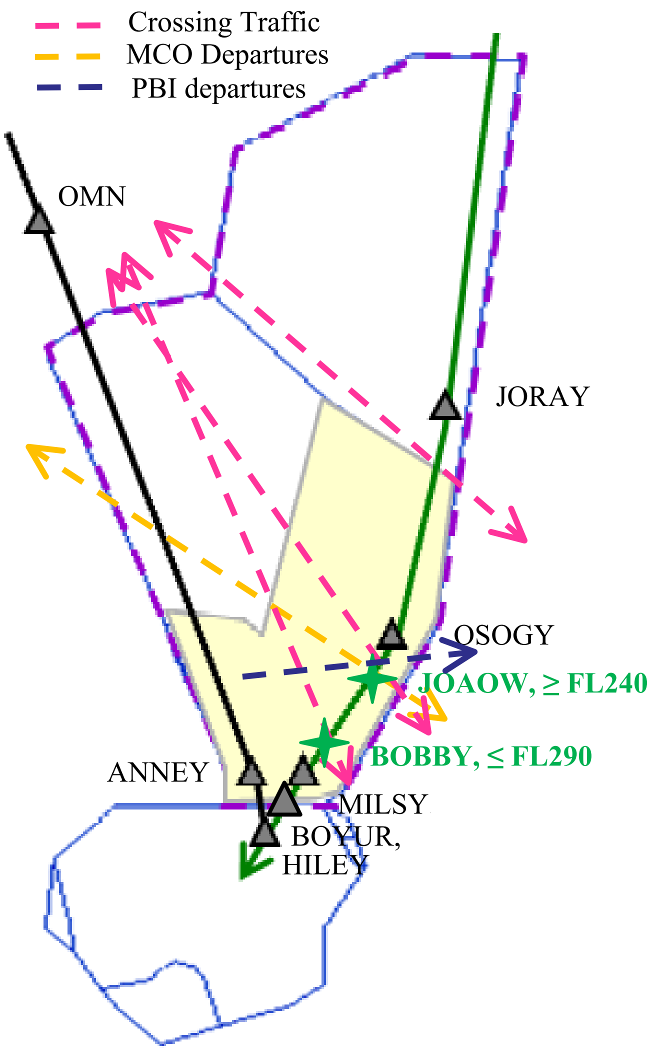
Metric	Baseline Average	Average CDA Difference from Baseline
Fuel Burn (gal)	324	- 52 (-16%)
CO_2 emissions (kg)	3121	-497 (-16%)
Time Flown (min)	31.6	+ 2.4 (+8%)



- **Estimated fuel burn reduction of 52 gallons per flight**
- **Estimated CO_2 emissions reductions of 497 kilograms per flight**
- **Observed flight time increase of 2.4 min/flight**
  - Consistent with increased route distance on the RUTLG in the terminal area
- **Fuel efficiency gains are most noticeable where baseline flights level off at FL240 and 16000 ft MSL**

Human In the Loop Simulations

- **Objective: Identify issues and possible mitigation strategies associated with conducting CDA during peak traffic operations**
  - Identify factors involved in deciding which aircraft could be cleared to the CDA
  - Investigate impact of CDA on surrounding traffic
    - Under what circumstances must the CDA be discontinued?
    - Identify methods for mitigating these impacts
  - Increase understanding of necessary inter-facility communications
- **Operational impacts of CDA identified through HITLs**
  - Crossing traffic
  - Merging traffic
  - Sector point-outs
  - Inter-facility coordination



Conclusions

- **OPD/CDA benefits demonstrated through AIRE demos at ATL and MIA**
  - ATL: Estimated fuel burn reductions of approximately 38 gallons per flight, CO_2 reductions of approximately 360 kg per flight
  - MIA: Estimated fuel burn reductions of approximately 48-52 gallons per flight, CO_2 reductions of approximately 460-500 kg per flight
- **Operational CDA impacts identified through HITLs at ATL and MIA**
  - Crossing traffic
  - Departure traffic
  - Sector point-outs
  - Inter-facility coordination
- **Airspace and airport impacts of CDA**
  - Sector geometries
  - Traffic flows in sector
  - CDA top-of-descent location

Meeting Agenda

9:00 Start

- Introductions
- AIRE Objectives and Program Organization
- Metrics Results and Plans
- Domain results and Plans:
  - Oceanic
  - Optimized Profile Descent (OPD)
  - **Tailored Arrival (TA)**
  - Surface
- Questions/Feedback/ Wrap-up
- Lunch
- Demonstrations

3:00 Adjourn

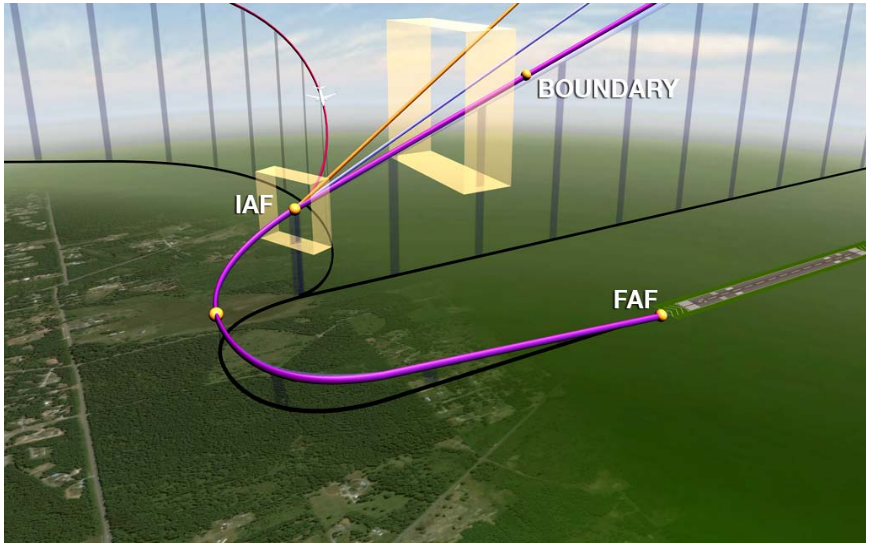
AIRE Tailored Arrival Points of Contact

Project Lead
Dr. Marc Buntin, ATO-P
Charles.Buntin@faa.gov
202-493-4697

Tailored Arrivals – What are they?

End State Description: “Dynamic STAR”

- **Tailored arrival — Key features:**
  - **Continuous (optimized) descent** from cruise altitude to touchdown
  - Tailored for traffic, environment, airspace
  - Controller-to-aircraft communication by data link*
  - Definition of flight path in both time and space (**4D Flight Path**)
  - **Flight path coordinated** through multiple air traffic domains, centers, sectors
- **Benefits:**
  - Emissions and fuel reduction anticipated
  - Noise significantly decreased (near idle descent)
  - Flight duration reduced by several minutes
  - Dramatically reduced VHF voice communication
  - Overall efficiency and predictability of flight path improved



* If the required data link functionality is not present, tailored arrivals can still be achieved by using pre-negotiated set of standard arrival processes pre-stored in FMS.

NOTE: TA development is an iterative process – End state objectives are far-term

Objectives for MIA TAs

- **Demonstrate and prove Tailored Arrivals concept in East Coast environment**
- **Employ and refine end-to-end Tailored Arrivals procedures validated in San Francisco:**
  - Second location, involving a new oceanic ATC facility (NYC), new domestic facilities (Miami ARTCC, Miami TRACON), two new airlines
  - New complexities
    - Separately located oceanic and en-route ATS facilities
    - Multiple en-route sector hand-offs
- **Opportunity to accelerate NextGen/SESAR**
- **Employ Tailored Arrivals profile design techniques to previous CDA baseline**
- **Provide additional data source for FAA Cost Benefit Analysis**

Current Tailored Arrivals – Phase I

- **Pre-planned RNAV routes which are designed for optimal descent for a given aircraft type – Continuous descent is the goal**
  - Routes extend from the oceanic boundary (NUCAR) to the runway threshold
- **Speed and Altitude constraints are designed for optimal routing through the airspace and to achieve a conflict-free descent**

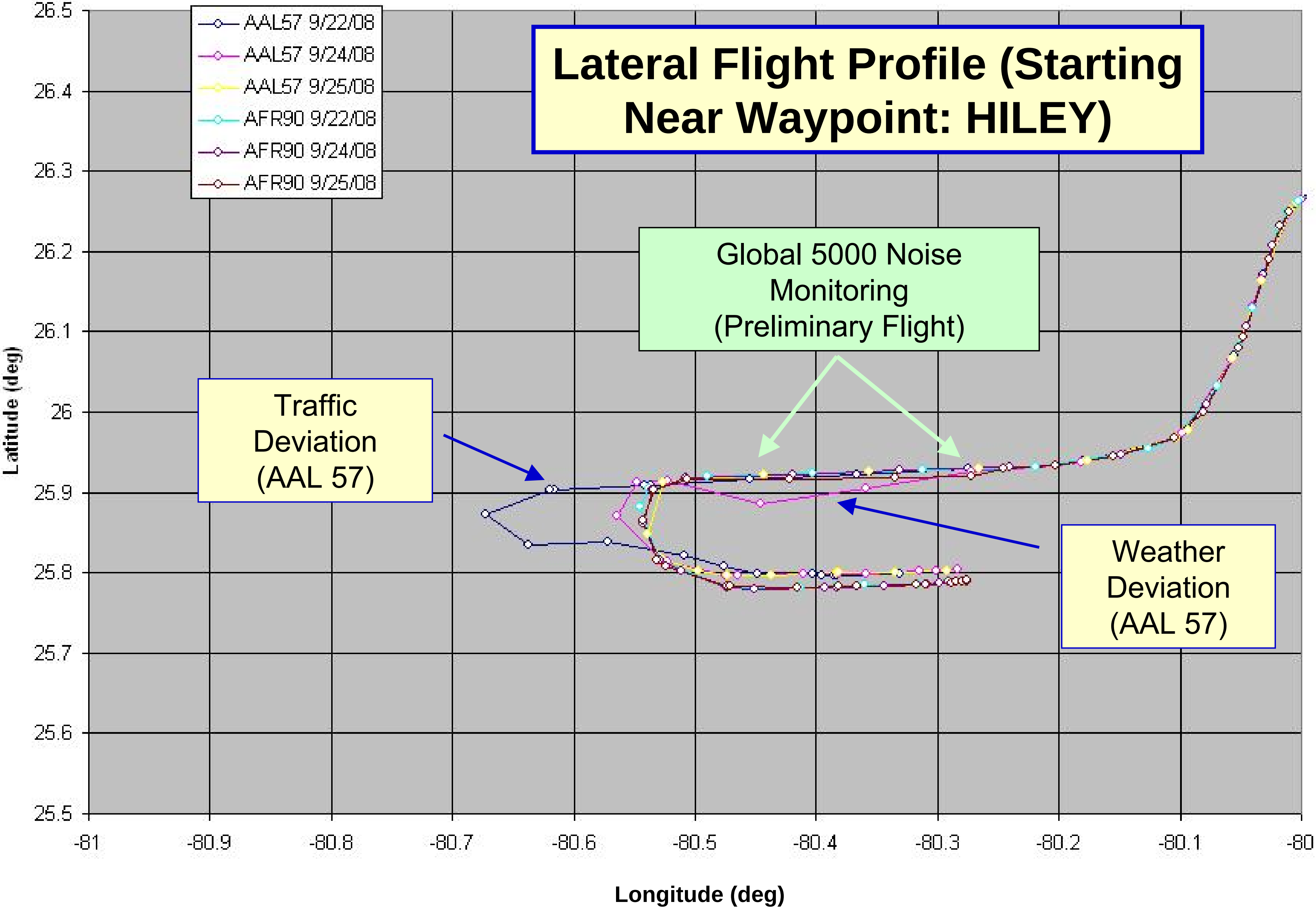
Current Tailored Arrivals

- **The clearances extend from the oceanic boundary (waypoint: SUMRS) to the runway threshold (RW 8L or RW 9)**
- **Clearance is issued via ATOP/Ocean 21 data-link approximately 45 minutes to 1 hour prior to oceanic exit point**
- **Special procedures (Cross Facility / Sector procedures) are followed allowing for an unambiguous and uninterrupted descent clearance between facilities and sectors**
  - TAs are broken off if necessary due to traffic, weather, etc.
  - Aircraft on TAs receive no priority handling

Up-linked Clearance

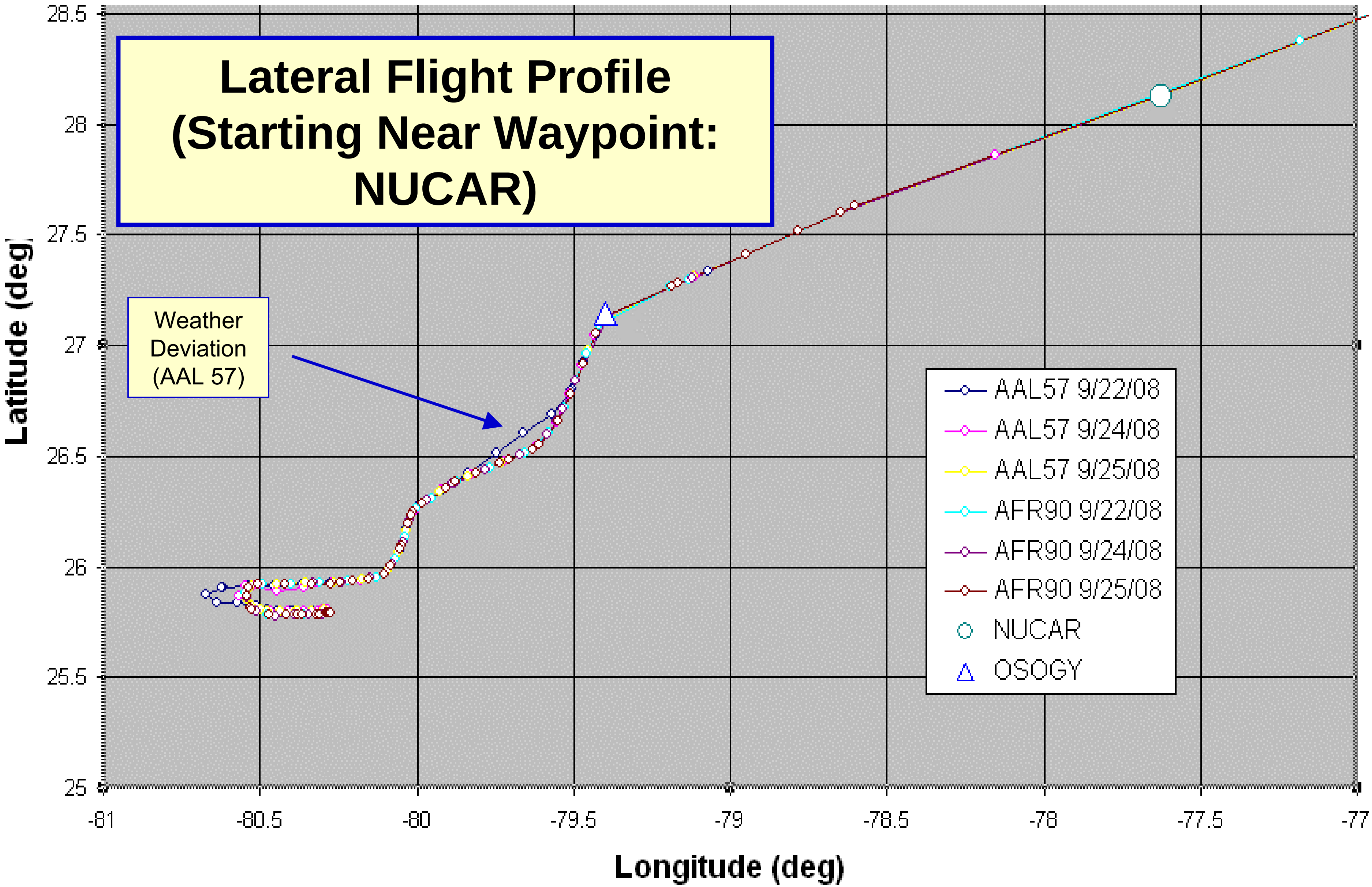
Miami Summary 22 – 25 Sep 08

- **6 participating flights:**
  - AF90 22 Sep: Full TA
  - AA57 22 Sep: Partial TA
  - AF90 24 Sep: Full TA
  - AA57 24 Sep: Partial TA
  - AF90 25 Sep: Partial TA
  - AA57 25 Sep: Full TA

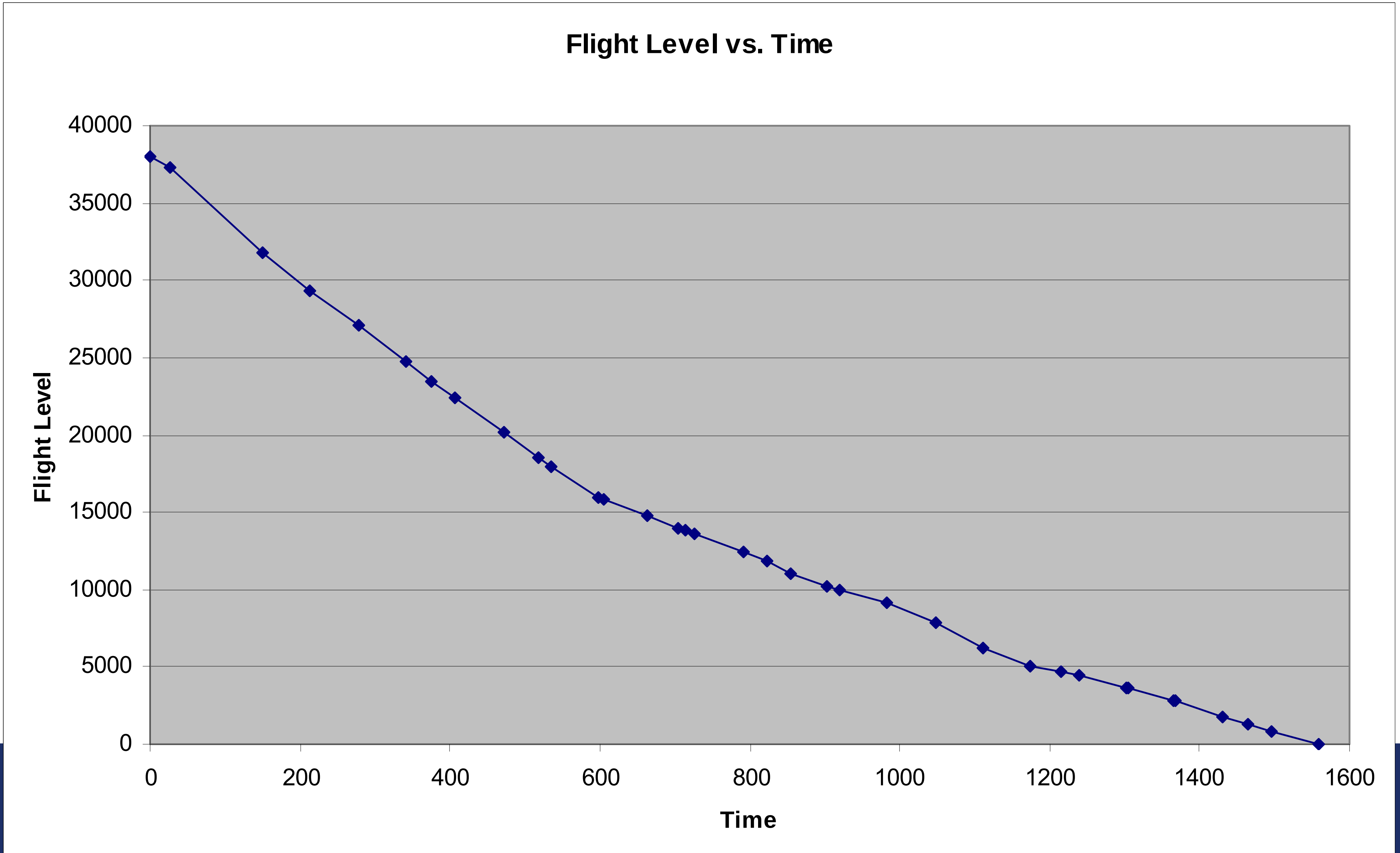


Lateral Flight Profile (Starting Near Waypoint: HILEY)
AAL57 9/22/08
AAL57 9/24/08
AAL57 9/25/08
AFR90 9/22/08
AFR90 9/24/08
AFR90 9/25/08
Global 5000 Noise Monitoring (Preliminary Flight)
Traffic Deviation (AAL 57)
Weather Deviation (AAL 57)
Latitude (deg)
Longitude (deg)
26.5
26.4
26.3
26.2
26.1
26
25.9
25.8
25.7
25.6
25.5
-81
-80.9
-80.8
-80.7
-80.6
-80.5
-80.4
-80.3
-80.2
-80.1
-80

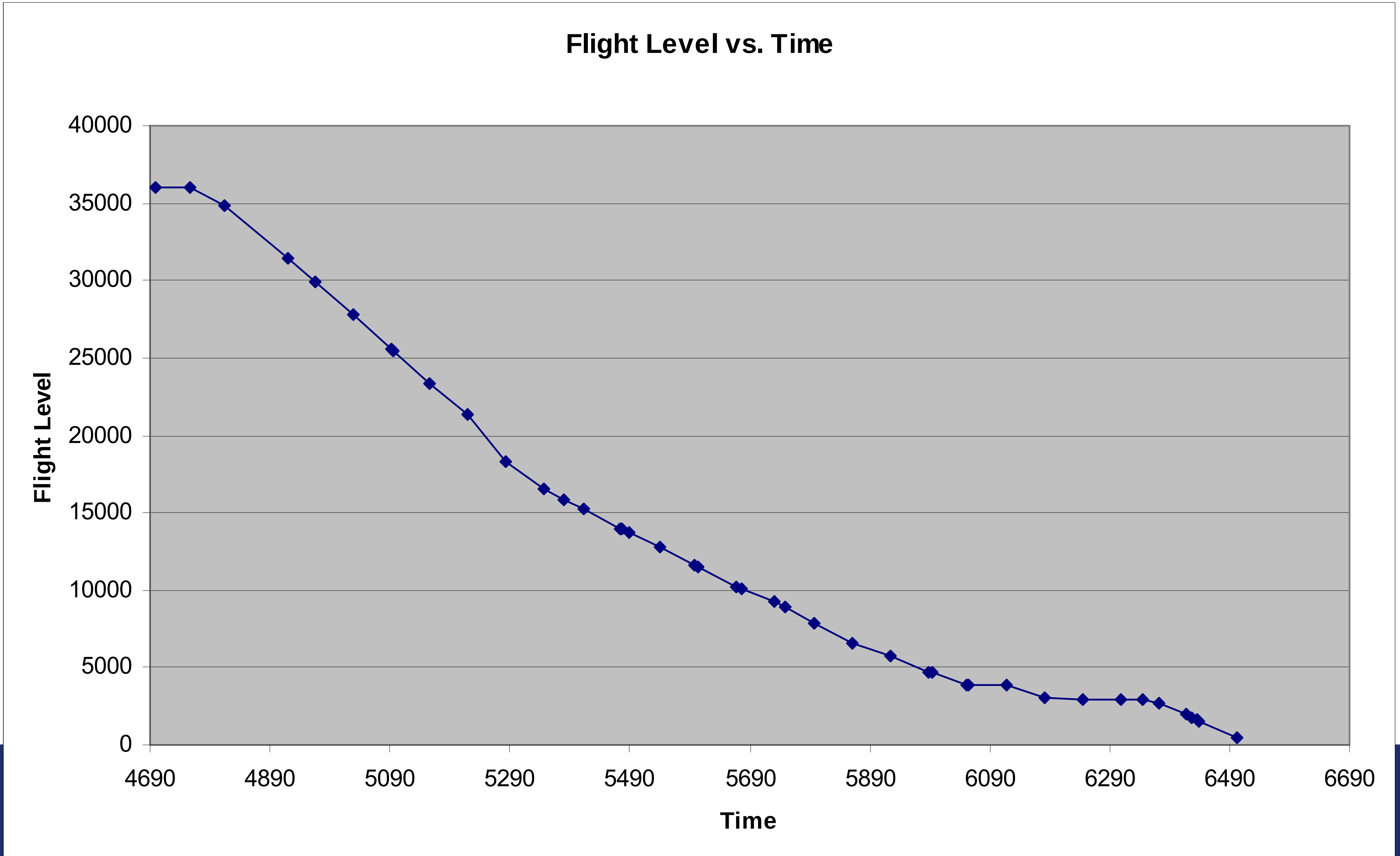
Lateral Flight Profile (Starting Near Waypoint: NUCAR)



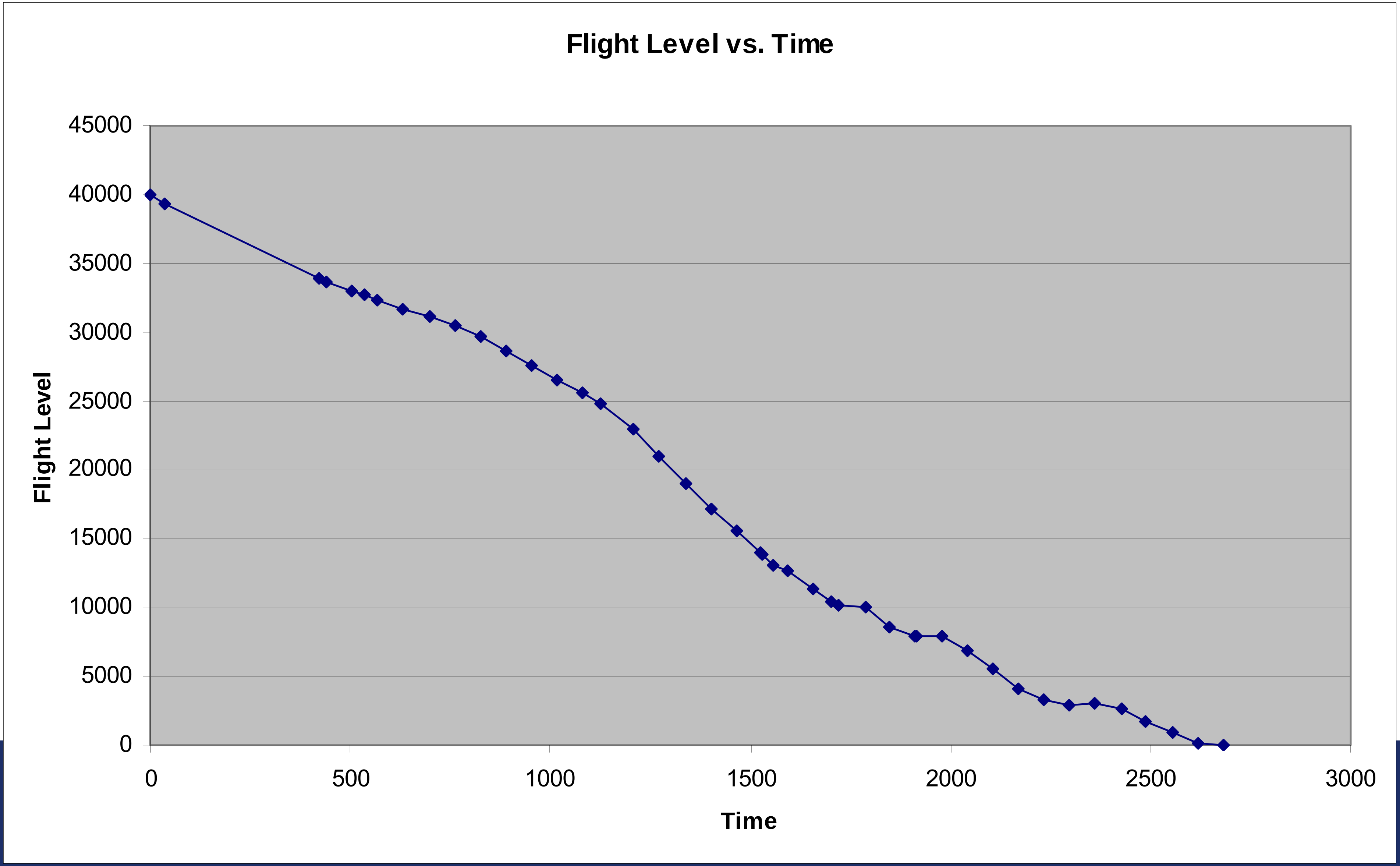
AF90 – 22 Sep 08



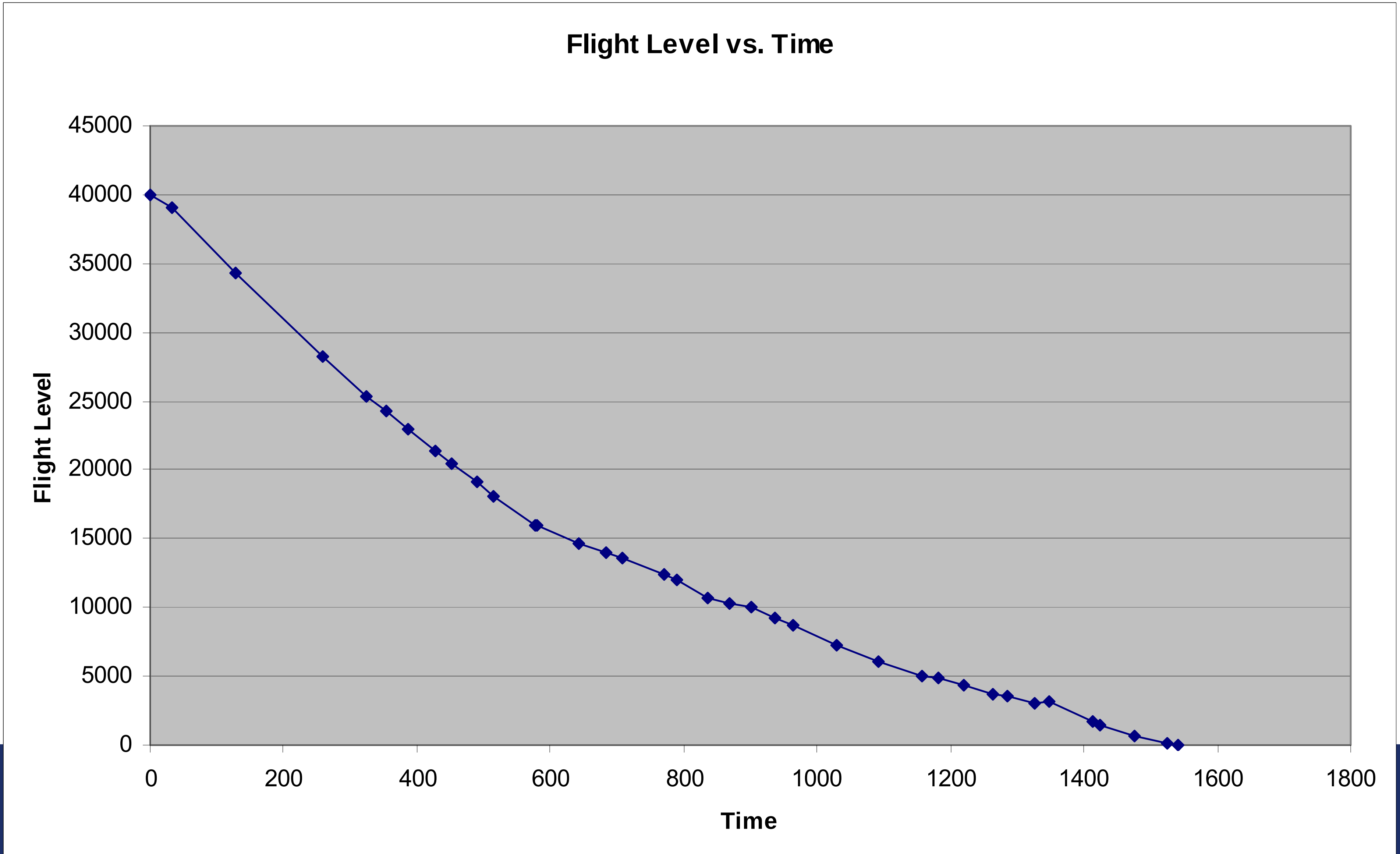
AA57 – 22 Sep 08Z



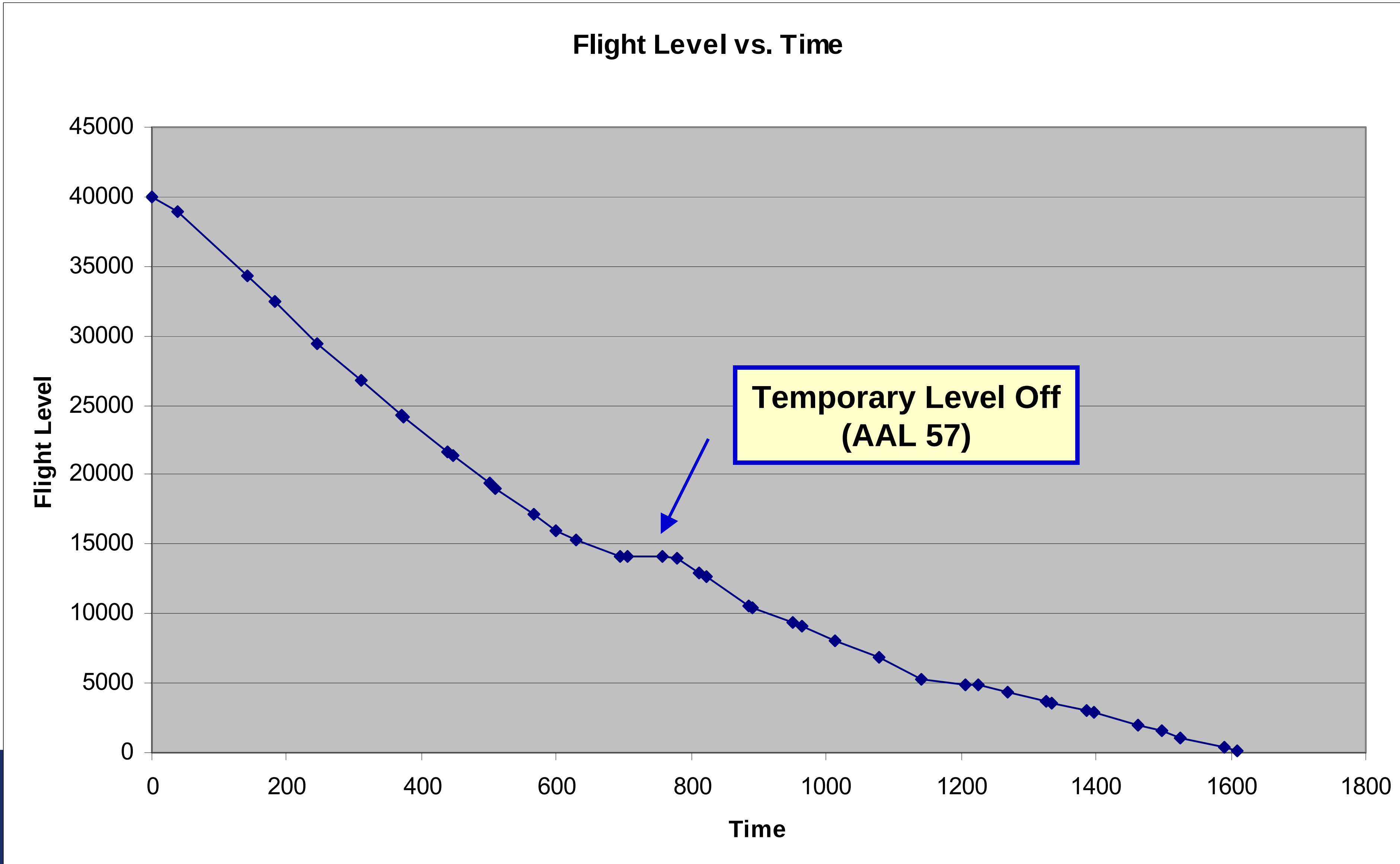
AF90 – 23 Sep 08Z (Non-TA flight)



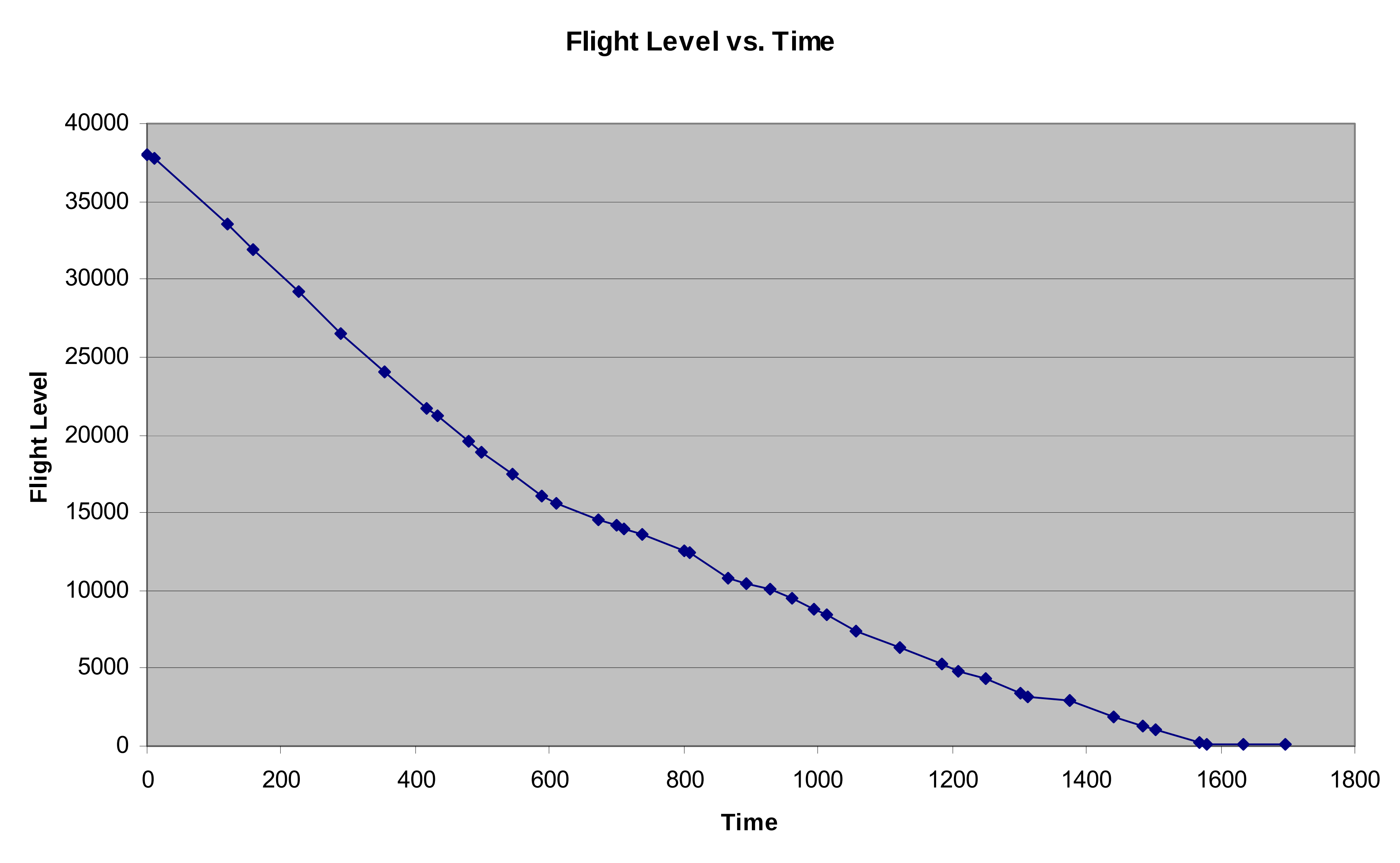
AF90 – 24 Sep 08Z



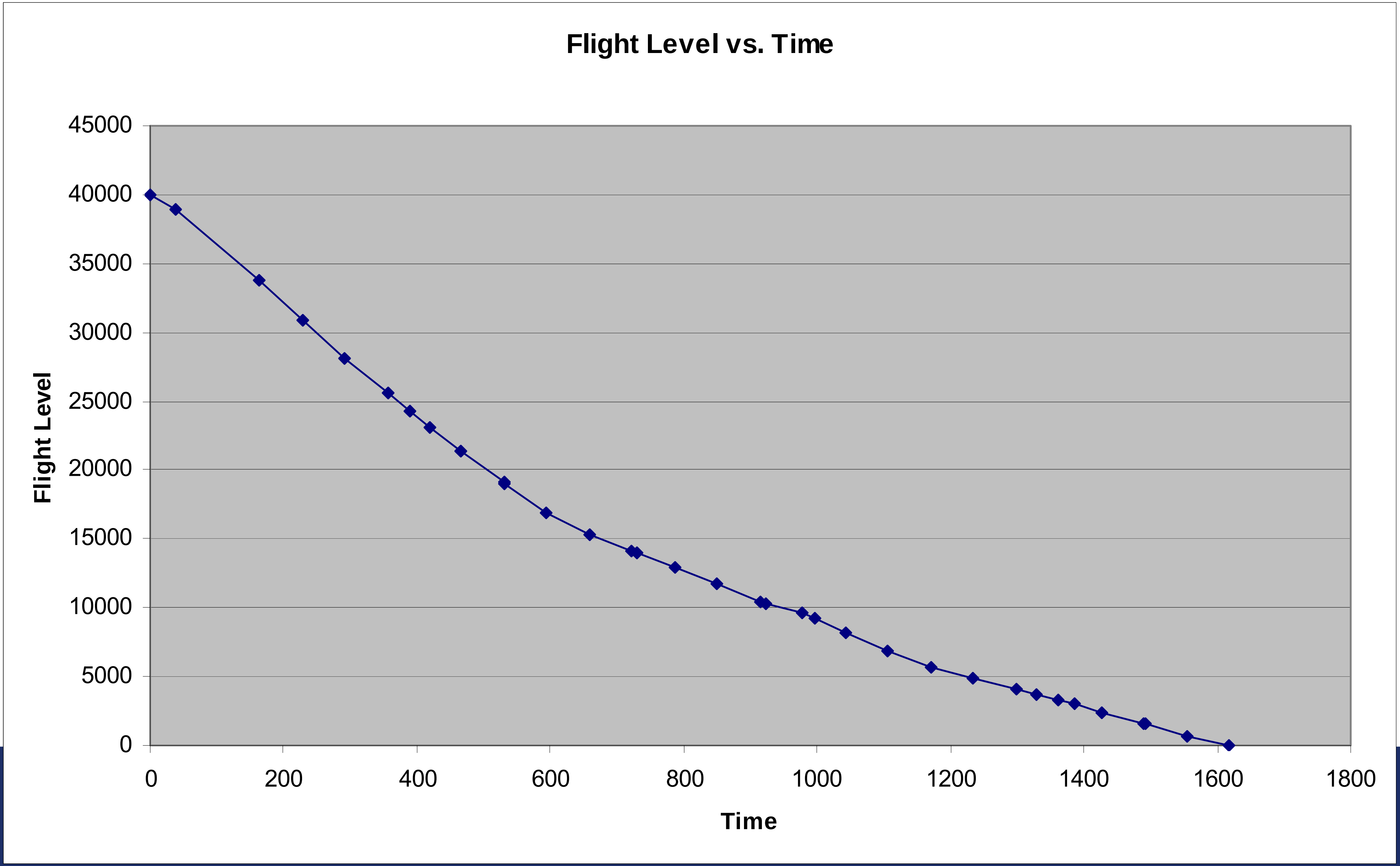
AA57 – 24 Sep 08Z



AF90 – 25 Sep 08



AA57 – 25 Sep 08



Phase 1 MIA Tailored Arrivals Preliminary Results

- **1 Week of testing was successfully conducted in Miami**
- **6 Tailored Arrivals (TAs) were flown during the week of September 22**
  - 3 TAs were flown by American Airlines Flight 57
  - 3 TAs were flown by Air France Flight 90
- **3 of the 6 Tailored Arrivals were full TAs while the remaining three were partial TAs (broken out of the TA momentarily)**
  - 1 was broken off due to temporary level-off as a precaution for traffic. Level-off could have been avoided by a procedural change (coming Phase 2)
  - 1 was broken off due to traffic near MIA
  - 1 was broken off due to weather in the Center airspace

Preliminary Results, Cont'd

- **Data analysis is underway – Anticipate significant fuel burn reduction**
- **FAA Global 5000 – Miami-Dade Airports (Environmental Office): "**The plane looked like a beautiful glider flying over-head – We could not hear it at all!"
- **Anecdotal comments from the flight crews report: TAs are very promising / they really liked the procedure – made some recommendations for procedural changes**
  - <u>Quote from an Air France Crew:</u> "A nice approach! We can already imagine that, in two or three years, when we will be use to the tailored arrivals, this will be very comfortable."
- **Deviations for traffic and weather executed well. All three aircraft rejoined the TA**
- **During pre-testing and Phase I, problems were found with ATOP in both the uplink and MIA coordination of clearance.**
  - Uplink issues resolved
  - Coordination issues remain which has necessitated a hold on Phase I activities to determine resolution and restart date of flight trials

Immediate Actions Underway

- Resolution of ATOP issues to restart TA trials
- Tweak arrivals for Phase 2 based on lessons learned
- Execute Phase 2 with the possibility of adding two Lufthansa flights (including one Airbus aircraft)
- Perform advanced planning for Phase 3
- Compute metrics for current flights and gear up for restart

Thank You!

We would like to extend a special thanks to Air France and American Airlines for their participation in these trials. We would like to extend thanks to the New York Center (ZNY) and the Miami Facilities (ARTCC, TRACON) and Miami-Dade Airports Office.

We've only just begun….

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3:00 Adjourn

AIRE Surface Point of Contact

Project Lead

Tom Prevost, ATO-P

Tom Prevost@faa.gov

202-267-3363

Airport Surface Trajectory-Based Operations (TBO)

Update to EWG

Tom Prevost
Federal Aviation Administration
Air Traffic Organization - Operations Planning
Advanced Technology Development & Prototyping

November 17-18, 2008

Surface Activities

- **Surface TBO Acquisition**
- **JFK Ramp Project**
- **Surface TBO Field Demo Sites**
  - Memphis
  - Orlando
- **R&D Activity**
  - Taxi Conformance
  - Display of Taxi Instructions on the Flight Deck

Surface TBO Acquisition

- **FAA Acquisition Management System (AMS) process**
- **Segmented project broken down into 5 implementation segments**
- **Currently in Segment 1 Concept/Requirements Development (CRD) phase**
  - Functional Architecture
  - Shortfall Analysis (first draft)
  - ConUse
- **Initial Investment Decision in September 2010**

JFK Ramp System - Status

- **ASDE-X and data distribution began operation in late August**
- **Ramp surveillance system operational in late September**
- **Port authority working procurement process for STM systems**
- **Delta Airlines using STM at JFK ramp tower and ATL ops center**
- **FAA Command Center acquiring commercial STM for TMU's at JFK ATCT, NY TRACON, and NY ARTCC**
- **Data feed to FAA HQ STBO lab pending installation for metrics collection**
  - Support for STBO acquisition business case

Memphis Surface TBO Field Demo Site

- **Initial Demo System Installed – Operational in July 2008**
- **Software Upgrades Installed Mid November**
- **NAS Change Proposal (NCP) Submitted for System Upgrades**
  - Scheduled for January 2009
- **Working Collaborative Interfaces to FedEx and NWA**
  - Initial interface in late January / early February 2009
- **Collaborative Departure Queue Management (CDQM) Demonstrations to Begin in Spring 2009**

Orlando Surface TBO Field Demo Site

- **Initial MCO Site Briefing Conducted on November 13**
- **Site Survey Scheduled for week of December 1**
- **Submit NAS Change Proposal (NCP) Package Mid December**
  - Expected approval in late February / early March 2009
- **Site Preparation – Early March 2009**
  - Power, communications, networking, rack installation
- **Equipment Installation – Late March 2009**
- **System / Software Integration & Testing – April 2009**
- **System Operational – May 2009**

Collaborative Departure Queue Management

- **Concept Initiated in Memphis Surface Working Group**
  - Need to manage excessive departure queues
  - Runway 9/27 to close for construction in March 2009
- **Flight operator receives an allocation of slots to enter the airport movement area (AMA)**
  - Allocations based on flight operator “fair share” of predicted available departure capacity
  - Allocations broken down into 15 minute blocks
  - Allocations not divulged to other carriers
  - Flight operator manages aircraft priority
- **CDQM concept intends to provide early environmental and fuel-burn benefits while preserving air carrier flexibility**

R&D Activity

- **Taxi Conformance & Cockpit Display of Taxi Clearance**
  - Literature search in progress
  - Initial ConOps to be developed – March 2009
  - Conduct simulations at MITRE ATM lab next summer

END